VOLUME 7 PART 6

NORTH AMERICAN FLORA

(UREDINALES)

AECIDIACEAE (continuatio)

JOSEPH CHARLES ARTHUR

DICAEOMA ON CARDUACEAE

JOSEPH CHARLES ARTHUR AND HERBERT SPENCER JACKSON

ALLODUS

JOSEPH CHARLES ARTHUR AND CLAYTON ROBERTS ORTON

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ANNOUNCEMENT

NORTH AMERICAN FLORA is designed to present in one work descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela, whose flora is essentially South American.

The work will be published in parts at irregular intervals, by the New York Botanical Garden, through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Myxomycetes, Schizophyta.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 34. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Dr. N. L. Britton, Dr. W. A. Murrill, and Dr. J. H. Barnhart.

Professor John M. Coulter, of the University of Chicago; Mr. Frederick V. Coville, of the United States Department of Agriculture; and Professor William Trelease, of the University of Illinois, have consented to act as an advisory committee.

Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups.

The subscription price is fixed at $1.50 for each part; it is expected that four or five parts will be required for each volume. A limited number of separate parts will be sold at $2.00 each. Address:

THE NEW YORK BOTANICAL GARDEN
BRONX PARK
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202. **Dicaeoma Menthae** (Pers.) S. F. Gray, Nat. Arr. Brit. Pl. 1: 542. 1821.

Uredo Menthae Pers. Syn. Fung. 220. 1801.
Puccinia Menthae Pers. Syn. Fung. 227. 1801.
Aecidium Menthae Sow. Engl. Fungi *pl. 398, f. 3.* 1803.
Uredo Calaminthae Strauss, Ann. Wett. Ges. **2**: 95. 1810.
Puccinia Clinopodii DC. Fl. Fr. **6**: 67. 1815.
Uredo Labiatarum DC. Fl. Fr. **6**: 72. 1815.
Uredo Menthastri Link, Ges. Nat. Freunde Berlin Mag. **7**: 27. 1815.
Caeoma (Dicaeoma) Menthae Mart. Fl. Erlang. 321. 1817.
Uredo Clinopodii Schw. Schr. Nat. Ges. Leipzig **1**: 70. 1822.
Caeoma Labiatarum Schlecht. Fl. Berol. **2**: 128. 1824.
Puccinia Labiatarum Schlecht. Fl. Berol. **2**: 133. 1824.
Caeoma menthatum Link, in Willd. Sp. Pl. 6^2: 47. 1825.
Puccinia Pycnanthemi Schw. Trans. Am. Phil. Soc. II. **4**: 295. 1832.
Erysibe Labiatarum Wallr. Fl. Crypt. Germ. **2**: 198. 1833.
Trichobasis Labiatarum Lév. Dict. Univ. Hist. Nat. **12**: 785. 1848.
Uredo Satureiae Cast. Cat. Pl. Marseille Suppl. 89. 1851.
Aecidium ovoideo-aurantium Bon. Coniom. 45. 1860.
Puccinia Calaminthae Fuckel, Symb. Myc. 56. 1869.
Puccinia Menthae americana Burrill, Bull. Ill. Lab. Nat. Hist. **2**: 191. 1885.
Dicaeoma Pycnanthemi Kuntze, Rev. Gen. 3^3: 470. 1898.

O. Pycnia amphigenous or caulicolous, gregarious in small groups, usually with the aecia, yellowish becoming brown, globoid, 95–160 μ in diameter by 80–120 μ high; ostiolar filaments 25–50 μ long.

I. Aecia chiefly hypophyllous, caulicolous, or petiolicolous, gregarious, often on distorted yellow or purplish areas, cupulate, 0.3–0.4 mm. in diameter; peridium whitish, fragile, the margin erect or incurved, lacerate; peridial cells narrowly rhomboidal, 10–16 by 32–45 μ, in longitudinal section slightly overlapping, the outer wall 3–5 μ thick, transversely striate, the inner wall 2–5 μ thick, closely verrucose; aeciospores globoid or ellipsoid, 15–20 by 18–29 μ; wall pale-yellow, 1.5–2 μ, closely and conspicuously verrucose.

II. Uredinia hypophyllous, scattered, occasionally in annular groups, rarely on brownish spots, round or oval, rather small, 0.3–0.7 by 0.3–1 mm., early naked, pulverulent, golden- or cinnamon-brown, ruptured epidermis noticeable; urediniospores globoid or ellipsoid, 16–22 by 20–26 μ; wall yellowish, about 1.5 μ thick, moderately echinulate with blunt points, the pores indistinct, about 3, equatorial.

III. Telia hypophyllous, sometimes caulicolous, numerous, scattered or grouped, occasionally confluent, roundish or oblong, 0.4–1 by 0.4–1.5 mm., early naked, pulverulent, dark chocolate-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid, 18–24 by 19–30 μ, rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, rather thick, 1.5–2.5 μ, thicker at apex, 3–6 μ, with a lighter papilla, moderately verrucose; pedicel pale, up to twice length of spore.

ON LAMIACEAE:

Blephilia ciliata (L.) Raf., Indiana.
Blephilia hirsuta (Pursh) Torr., Illinois, Indiana, Iowa, Missouri, West Virginia.
Clinopodium vulgare L., Connecticut, New York, Pennsylvania, Virginia, West Virginia; Ontario.
Cunila origanoides (L.) Britton (*C. Mariana* L.), Arkansas, Illinois, Indiana, Kentucky, Maryland, Missouri, New Jersey, Pennsylvania, Virginia.
Hedeoma Drummondii Benth., Montana.
Hedeoma oblongifolia (A. Gray) A. Heller, New Mexico.
Hedeoma pulegioides (L.) Pers., Illinois, Pennsylvania.
Hedeoma sp. Arizona.
Koellia albescens (T. & G.) Kuntze, Arkansas.
Koellia flexuosa (Walt.) MacM. (*Pycnanthemum linifolium* Pursh, *P. flexuosum* B.S.P.), Arkansas, Michigan, Missouri, New York, Pennsylvania, Virginia; Ontario.
Koellia incana (L.) Kuntze (*Pycnanthemum incanum* Michx.), New York, Pennsylvania, West Virginia.
Koellia mutica (Michx.) Britton (*Pycnanthemum muticum* Pers.), Connecticut, Delaware, New Jersey, New York, Pennsylvania, West Virginia.
Koellia pilosa (Nutt.) Britton (*Pycnanthemum pilosum* Nutt.), Illinois, Indiana, Iowa, Kansas, Missouri, West Virginia.
Koellia verticillata (Michx.) Kuntze (*Pycnanthemum verticillatum* Pers.), West Virginia.
Koellia virginiana (L.) MacM. (*Pycnanthemum lanceolatum* Pursh, *P. virginianum* Durand & Jacks.), Connecticut, Indiana, Iowa, Missouri, Nebraska, New Jersey, New York, North Dakota, Pennsylvania, Wisconsin; Ontario.
Mentha arvensis L., Florida, New York; Nova Scotia.
Mentha canadensis L., Colorado, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New York, North Dakota, Oregon, Pennsylvania,

South Dakota, Utah, Washington, Wisconsin, Wyoming; Nova Scotia, Ontario, Quebec.
Mentha canadensis lanata Piper, California, Oregon.
Mentha Cardiaca Baker, Michigan.
Mentha gentilis L. (*M. sativa* L.), Maine.
Mentha glabrior (Hook.) Rydb. (*M. borealis* Michx.), Colorado.
Mentha Penardi (Briq.) Rydb., Arizona, Colorado, New Mexico, Utah.
Mentha piperita L., New Hampshire, New York, Oregon.
Mentha spicata L., Kentucky, Maryland, Massachusetts, Michigan, New Mexico, New York, Oregon, Pennsylvania, Utah, Virginia, Washington, West Virginia; Ontario.
Monarda Bradburiana Beck, Arkansas.
Monarda clinopodia L., New York.
Monarda comata Rydb., Colorado, New Mexico.
Monarda didyma L., Connecticut, New York, Pennsylvania, West Virginia; Ontario.
Monarda fistulosa L., Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, North Dakota, Ohio, Pennsylvania, South Dakota, Virginia, West Virginia, Wisconsin, Wyoming; Alberta, Ontario.
Monarda media Willd., New York, West Virginia.
Monarda menthaefolia Benth., Arizona, Colorado, Montana, Utah; Alberta.
Monarda mollis L. (*M. scabra* Beck), Montana, Nebraska, New York, Oklahoma, South Dakota; Manitoba; Yukon.
Monarda punctata L., Delaware, Illinois, Indiana, New Jersey, Texas, Wisconsin.
Monarda Ramaleyi A. Nelson, Colorado.
Monarda stricta Wooton, Colorado, New Mexico.
Monarda sp., Saskatchewan.

TYPE LOCALITY: Europe, on *Mentha sylvestris*.

DISTRIBUTION: Nova Scotia to Virginia and westward to Arizona and Alberta; also in Europe, Asia, Africa, and Australia.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 131;* McAlpine, Rusts Austr. *pl. 29, f. 250;* Krypt.-fl. Brand. Pilze **3**: *f. B41*; Corda, Ic. Fung. **4**: *pl. 4, f. 37.*

EXSICCATI: Barth. Fungi Columb. *2264, 2459, 2565, 2566, 2668, 2669, 2768, 2769, 2859, 2964, 3069, 3259, 3360, 3458, 3560, 3667, 3762, 4270, 4271, 4362, 4363, 4464, 4465, 4968, 4969;* Barth. N. Am. Ured. *156, 246, 353, 354, 458, 555, 648, 750, 751, 853, 949, 950, 1061, 1062, 1163, 1258, 1354, 1355, 1458, 1459, 1560, 1659, 1767, 1856, 1857, 1954, 1955, 2048, 2049, 2153, 2154, 2155, 2254, 2255;* Brenckle, Fungi Dak. *14, 342, 465*; Clements, Crypt. Form. Colo. *140, 570;* Ellis, N. Am. Fungi *252, 1461a, b, c;* Ellis & Ev. Fungi Columb. *188a, 188(a), 1461, 1649, 1767, 1858, 2064;* Garrett, Fungi Utah. *187, 216, 217;* D. Griff. W. Am. Fungi *7, 83, 291, 291a;* Kellerm. Ohio Fungi *90;* Seym. & Earle, Econ. Fungi *493a, b, c;* Sydow, Ured. *275, 476, 2035, 2418, 2527.*

203. **Dicaeoma Micromeriae** (Dudley & Thompson) Arthur.

Puccinia Micromeriae Dudley & Thompson, Jour. Myc. **10**: 54. 1904.

O. Pycnia hypophyllous, scattered among the aecia, inconspicuous, brownish, globoid or flattened-globoid, 125–160 μ wide by 110–130 μ high; ostiolar filaments 25–50 μ long.

I. Aecia hypophyllous and caulicolous, scattered, causing distortion and an erect growth of the stems, cupulate, 0.3–0.4 mm. across; peridium white, the margin erect, lacerate; peridial cells oval, 15–25 by 25–45 μ, abutted, the outer wall 5–8 μ thick, transversely striate, the inner wall 3–6 μ thick, verrucose; aeciospores globoid or ellipsoid, 16–23 by 19–30 μ; wall pale-yellow, 1.5–2.5 μ thick, closely verrucose.

II. Uredinia hypophyllous, scattered or clustered on paler areas, roundish, 0.4–1 mm. across, at first covered by the pink epidermis, later naked, pulverulent, yellowish, ruptured epidermis noticeable; urediniospores obovoid or ellipsoid, 16–22 by 22–29 μ; wall pale-yellow, 1.5–2.5 μ thick, moderately and inconspicuously echinulate, the pores obscure, about 3, equatorial.

III. Telia chiefly hypophyllous or caulicolous, scattered, roundish, small, 0.3–2 mm. across, early naked, pulverulent, chestnut-brown, ruptured epidermis not noticeable; teliospores broadly ellipsoid, 19–23 by 24–30 μ, rounded at both ends, slightly or not constricted at septum; wall cinnamon-brown, 1.5–2.5 μ thick, thickened at apex up to 7 μ with usually a lighter papilla, moderately verrucose; pedicel about length of spore.

ON LAMIACEAE:
Micromeria Chamissonis (Benth.) Greene (*M. Douglasii* Benth.), California, Idaho, Oregon, Washington.

TYPE LOCALITY: Santa Cruz, California, on *Micromeria Chamissonis*.
DISTRIBUTION: Southern Washington and Idaho to central California.
EXSICCATI: Barth. N. Am. Ured. *752.*

204. **Dicaeoma Monardellae** (Dudley & Thompson) Arthur.

Puccinia Monardellae Dudley & Thompson, Jour. Myc. **10**: 53. 1904.

O. Pycnia not seen.

I. Aecia amphigenous and caulicolous, causing hypertrophy, scattered, short-cylindric;

peridium erect, lacerate; aeciospores angular, globoid or oblong, 16–25 by 24–39 μ; wall minutely and closely verrucose.

II. Uredinia hypophyllous, scattered, occasionally confluent, roundish or oval, 0.3–1.5 mm. across, early naked, pulverulent, ochraceous, ruptured epidermis noticeable; urediniospores obovoid, 16–21 by 22–30 μ; wall pale-yellow, 1–2 μ thick, moderately and bluntly echinulate, the pores often obscure, about 3, equatorial.

III. Telia hypophyllous, numerous, scattered or in small groups, roundish, 0.3–1 mm. across, early naked, pulverulent, chocolate-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid or globoid, 19–25 by 25–36 μ, rounded at both ends, slightly or not constricted at septum; wall chestnut- or dark reddish-brown, rather thick, 2–4 μ, somewhat thicker above, 3–7 μ, moderately and conspicuously tuberculate; pedicel pale, up to twice length of spore, often wider near the base.

ON LAMIACEAE:
Madronella lanceolata (A. Gray) Greene (*Monardella lanceolata* A. Gray), California.
Madronella macrantha (A. Gray) Greene (*Monardella macrantha* A. Gray), California.
Madronella nana (A. Gray) Greene (*Monardella nana* A. Gray), California.
Madronella odoratissima (Benth.) Greene (*Monardella odoratissima* Benth.), California, Oregon.
Madronella parvifolia (Greene) Rydb. (*Monardella parvifolia* Greene), New Mexico.
Madronella undulata (Benth.) Greene (*Monardella undulata* Benth.), California.
Madronella villosa (Benth.) Greene (*Monardella villosa* Benth.), California, Oregon.
Madronella viridis (Jepson) Arth. (*Monardella viridis* Jepson), California.
TYPE LOCALITY: Santa Cruz, California, on *Monardella villosa*.
DISTRIBUTION: Northern Oregon to southern California and western New Mexico.
EXSICCATI: Barth. N. Am. Ured. *459, 753;* Ellis & Ev. Fungi Columb. *188b;* Sydow, Ured. *1775*.

205. **Dicaeoma Leonotidis** (P. Henn.) Arthur.

Uredo Leonotidis P. Henn. in Engler, Pfl. Ost.-Afr. **C**: 52. Je 1895.
Aecidium Leonotidis P. Henn. in Engler, Pfl. Ost.-Afr. **C**: 52. Je 1895.
Uredo cancerina P. Henn. Hedwigia **34**: 330. D 1895.
Uredo leonoticola P. Henn. Hedwigia Beibl. **38**: 69. 1899.
Puccinia leonotidicola P. Henn. in H. Baum, Kun.-Samb. Exp. 2. 1903.
Puccinia Leonotidis Arth. Mycologia **7**: 245. 1915.

O. Pycnia hypophyllous; pycniospores oblong, 2.5–3 by 4–5 μ.

I. Aecia amphigenous, chiefly hypophyllous, gregarious on yellowish spots, sometimes solitary, pustulate; peridium finally cupulate; aeciospores globoid, oblong, or ovoid, 20–24 by 20–32 μ; wall hyaline or pale-yellow, verrucose.

II. Uredinia amphigenous, numerous, scattered or grouped, roundish, small, 0.2–1 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; urediniospores oblate-spheroid, 21–27 μ broad by 19–23 μ high; wall cinnamon-brown, rather thin, 1–1.5 μ, thicker above, 1.5–2 μ, finely and closely echinulate, the pores 4 or 5, basal, around the hilum.

III. Telia amphigenous, few, on indistinct yellowish-brown spots, small, about 0.5 mm. in diameter, rather pulverulent, brown; teliospores ellipsoid, 18–23 by 25–32 μ, rounded at both ends, slightly or not constricted at septum; wall yellowish-brown, smooth, thickened at apex up to 5 μ with a papilla; pedicel hyaline, as long as spore.

ON LAMIACEAE:
Leonotis nepetaefolia (L.) R. Br., Cuba; Bahamas; Jamaica; Porto Rico; Santo Domingo.
TYPE LOCALITY: Africa, on *Leonotis velutina*.
DISTRIBUTION: West Indies; also in South America and Africa.
EXSICCATI: Barth. N. Am. Ured. *781, 1658*.

206. **Dicaeoma fuscatum** (Arth. & Holway) Arthur.

Puccinia fuscata Arth. & Holway; Arth. Am. Jour. Bot. **5**: 486. 1918.

O. Pycnia epiphyllous, crowded in small groups 0.8–1 mm. across, inconspicuous, light- or dark-brown, globoid or slightly flattened-globoid, 128–144 by 128–150 μ; ostiolar filaments short, up to 35 μ long.

I. Aecia hypophyllous, in small groups of two to five opposite the pycnia, round, 0.1–0.4 mm. across; peridium wanting but with a more or less definite layer of mycelium bordering the aecium, opening by a slit or pore in the overarching epidermis; aeciospores ellipsoid, ellipsoid-oblong, or globoid, 23–29 by 26–33 μ; wall colorless, 1.5 μ thick, closely and coarsely verrucose.

II. Uredinia hypophyllous, scattered, round or oval, 0.1–0.6 mm. across, early naked, pulverulent, golden-brown, ruptured epidermis rather inconspicuous; urediniospores broadly ellipsoid or obovoid, 23–26 by 26–32 μ; wall cinnamon-brown, 1.5 μ thick, moderately echinulate, the pores 2, equatorial.

III. Telia hypophyllous, scattered, round, 0.2–0.4 mm. across, early naked, pulvinate, light chestnut-brown becoming cinereous from germination, ruptured epidermis inconspicuous; teliospores clavate, ellipsoid-clavate, or oblong, 20–27 by 38–56 μ, rounded above, usually narrowed below, constricted at septum; wall dark cinnamon-brown above, lighter or colorless below, very thin, 1 μ or less, collapsing somewhat, thickened at apex, 5–10 μ, smooth; pedicel colorless, 35–60 μ long.

ON LAMIACEAE:
Cunila leucantha Benth., Guatemala.
Cunila polyantha Benth., Guatemala.
TYPE LOCALITY: Quezaltenango, Guatemala, on *Cunila leucantha*.
DISTRIBUTION: Guatemala.

207. **Dicaeoma Hyptidis** (M. A. Curt.) Arthur.

Uredo Hyptidis M. A. Curt. Am. Jour. Sci. II. **6**: 353. 1848.
Puccinia Hyptidis Tracy & Earle, Bull. Miss. Exp. Sta. **34**: 86. 1895.
Gymnoconia Hyptidis Lagerh. Tromsö Mus. Aarsh. **17**: 83. 1895.
Argotelium Hyptidis Arth. Résult. Sci. Congr. Bot. Vienne 343. 1906.
Eriosporangium Hyptidis Arth. N. Am. Flora **7**: 211. 1912.

O. Pycnia amphigenous, few in small groups on discolored spots, inconspicuous, flask-shaped, barely protruding above surface of leaf, 110–140 μ broad by 160–175 μ high.

I. Aecia amphigenous, surrounding the pycnia, few in rounded or elongate groups 2–5 mm. across, along the nerves on somewhat larger reddish spots, round or oval, bullate, 0.5–1 mm. across, somewhat tardily dehiscent by irregular slits, orange-colored fading to dirty-white, overarching epidermis reddish and prominent; peridium wanting; aeciospores globoid, 26–32 by 29–33 μ, mostly 28–30 μ in diameter; wall nearly or quite colorless, appearing very thick, 2.5–3 μ, closely and coarsely verrucose.

II. Uredinia hypophyllous, scattered, round, 0.2–0.5 mm. across, soon naked, dark cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globoid, 22–27 μ in diameter; wall cinnamon-brown, moderately thin, about 1.5 μ, finely echinulate, the pores 2, opposite in the equator, more or less inconspicuous.

III. Telia hypophyllous, scattered, round, small, 0.1–0.3 mm. across, early naked, pulvinate, very pale-brownish, cinereous by germination, ruptured epidermis inconspicuous; teliospores fusiform or lance-oblong, 15–19 by 45–70 μ, narrowed or obtuse at both ends, constricted at septum; wall nearly or quite colorless, smooth, uniformly thin, about 1 μ; pedicel nearly or quite colorless, terete, delicate, one half to once length of spore.

ON LAMIACEAE:
Hyptis capitata (L.) Jacq. (*Mesosphaerum capitatum* Kuntze), Costa Rica; Cuba; Jamaica; Porto Rico.
Hyptis radiata Willd. (*Mesosphaerum rugosum* Poll.), Florida, Mississippi, South Carolina.
Hyptis Shaferi Britton, Cuba.
TYPE LOCALITY: Santee Canal, South Carolina, on *Hyptis radiata*.
DISTRIBUTION: Along the coast from South Carolina to Mississippi and southward through the West Indies.

208. **Dicaeoma medellinense** (Mayor) Arthur.

Aecidium Hyptidis P. Henn. Hedwigia **34**: 337. 1895. Not *Dicaeoma Hyptidis* Arth. 1920.
Puccinia medellinensis Mayor, Mém. Soc. Neuch. Sci. Nat. **5**: 497. 1913.

O. Pycnia amphigenous, few in small groups on slightly discolored spots, inconspicuous, globoid, barely protruding above surface of leaf, 100–175 μ broad by 100–150 μ high.

I. Aecia amphigenous and caulicolous, few in orbicular groups, or more on thickened spots when caulicolous, orbicular, small, 0.1–0.3 mm. across, soon open, orange-colored fading to dirty-white; peridium very fragile and evanescent, less conspicuous than the ruptured epidermis; peridial cells loosely overlapping, small, 18–26 μ long, linear in radial section, 5–10 μ across, the outer wall thin, 1–1.5 μ, smooth, the inner wall somewhat thicker, about 3 μ, moderately verrucose; aeciospores irregularly ellipsoid or lance-oblong, often acute above, 16–24 by 23–34 μ; wall nearly or quite colorless, moderately thick, 1.5–2.5 μ, closely and finely but conspicuously verrucose.

II. Uredinia chiefly hypophyllous, scattered, round, small, 0.1–0.3 mm. across, soon naked, dark cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globoid, 19–23 μ in diameter; wall cinnamon-brown, thin, 1–1.5 μ, finely echinulate, the pores very indistinct, 2 sometimes 3, in the equator.

III. Telia hypophyllous, scattered, round, small, 0.1–0.3 mm. across, early naked, pulvinate, white, ruptured epidermis inconspicuous; teliospores oblong, 16–22 by 30–35 μ, obtuse or rounded at both ends, slightly constricted at septum; wall colorless, smooth, uniformly thin, about 1 μ; pedicel colorless, terete, delicate, one half to once length of spore.

ON LAMIACEAE:
Hyptis atrorubens Poir. (*Mesosphaerum atrorubens* Kuntze), Porto Rico.
Hyptis pectinata (L.) Poir. (*Mesosphaerum pectinatum* Kuntze), Costa Rica; Guatemala; Cuba; Jamaica; Porto Rico.
Hyptis polystachya H.B.K., Costa Rica; Guatemala.
Hyptis suaveolens (L.) Poir. (*Mesosphaerum suaveolens* Kuntze), Costa Rica; Cuba; Jamaica; Porto Rico.
TYPE LOCALITY: Medellin, Columbia, on *Hyptis pectinata*.
DISTRIBUTION: Central America and the West Indies; also in South America.
ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. **5**: *f. 28*.

209. **Dicaeoma fidele** Arthur.

Puccinia fidelis Arth. Bull. Torrey Club **38**: 369. 1911.
Eriosporangium fidelis Arth. N. Am. Flora **7**: 212. 1912.

O. Pycnia hypophyllous, grouped among the aecia, prominent, punctiform, in section imperfectly flask-shaped with shallow base, large, 112–144 μ broad by 65 μ high; protruding conoidal mass of ostiolar filaments 60–90 μ high.

I. Aecia hypophyllous and caulicolous, abundant, scattered over the whole plant from a diffused mycelium, causing some hypertrophy and etiolation, chiefly seated on the woody tissues and hence often in rows along the veins, bullate, mostly oval, large, 0.8–1.3 mm. across, somewhat tardily dehiscent by irregular slits, orange-colored fading to dirty-white, overarching epidermis reddish and prominent; peridium wanting; aeciospores globoid, 20–24 by 23–30 μ, mostly 23–26 μ in diameter; wall nearly or quite colorless, appearing very thick, 2.5–3 μ, coarsely and closely verrucose.

II. Uredinia hypophyllous, scattered, round, small, 0.1–0.2 mm. across, soon naked, dark cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globoid, 21–24 by 23–26 μ, usually 23–25 μ in diameter; wall cinnamon-brown, rather thin, 1–1.5 μ, finely and abundantly echinulate, the pores usually inconspicuous, generally 4 near the hilum.

III. Telia hypophyllous, scattered, round, small, 0.1–0.2 mm. across, early naked, pulvinate, very pale-brownish, cinereous by germination, ruptured epidermis inconspicuous; teliospores oblanceolate or fusiform, 17–19 by 50–67 μ, narrowed or obtuse at both ends, somewhat constricted at septum, the upper cell usually shorter, and somewhat inverted topshaped; wall nearly or quite colorless, uniformly thin, 1 μ or less, smooth; pedicel nearly or quite colorless, terete, delicate, short, fragile.

ON LAMIACEAE:
Hyptis lilacina Schiede & Deppe (*Mesosphaerum lilacinum* Kuntze), Costa Rica; Guatemala.
Hyptis pectinata (L.) Poir. (*Mesosphaerum pectinatum* Kuntze), Guatemala.
Hyptis stellulata Benth. (*Mesosphaerum stellulatum* Kuntze), Jalisco.
Hyptis urticoides H.B.K. (*Mesosphaerum urticoides* Kuntze), Guatemala.
TYPE LOCALITY: Hills near Guadalajara, Mexico, on *Hyptis stellulata*.
DISTRIBUTION: Central Mexico and Central America.

210. **Dicaeoma insititium** Arthur.

Puccinia insititia Arth. Mycologia **7**: 248. 1915.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round, 0.3–0.6 mm. across, rather early naked, ruptured epidermis evident, often white and appearing peridioid; urediniospores globoid or broadly ellipsoid, 20–25 by 23–29 μ; wall dark cinnamon-brown, thin, 1–1.5 μ, closely and finely echinulate, the pores 3, equatorial, often indistinct.

III. Telia not seen; teliospores in the uredinia, narrowly ellipsoid, 16–24 by 48–55 μ, rounded or obtuse above, rounded or narrowed below, slightly or not constricted at septum; wall colorless, thin, 1 μ or less, smooth; pedicel colorless, delicate, about half length of spore.

ON LAMIACEAE:
Hyptis lantanifolia Poir. (*Mesosphaerum lantanifolium* Kuntze), Cuba; Porto Rico.
TYPE LOCALITY: Manáos in the Amazon region of Brazil, on *Mesosphaerum lantanifolium*.
DISTRIBUTION: West Indies; also in Brazil.

211. **Dicaeoma Hyptidis-mutabilis** (Mayor) Arthur.

Puccinia Hyptidis-mutabilis Mayor, Mém. Soc. Neuch. Sci. Nat. **5**: 496. 1913.

O. Pycnia not seen.

I. Aecia amphigenous in crowded groups about 1–2.5 mm. across, round or oblong, 0.2–0.5 mm. across; peridium very fragile and evanescent, frequently less conspicuous than epidermis; peridial cells irregularly cylindric, 19–26 by 23–32 μ in face view, overlapping, the outer wall about 3 μ thick, smooth, the inner wall 3–4 μ thick, conspicuously verrucose; aeciospores ellipsoid, ovoid, or broadly ellipsoid, 16–19 by 21–31 μ; wall light-yellow, about 1.5–2.5 μ thick, closely and coarsely verrucose, the markings somewhat deciduous.

II. Uredinia hypophyllous, scattered or somewhat grouped, round, 0.1–0.3 mm. in diameter, early naked, pulverulent, light cinnamon-brown, ruptured epidermis evident; urediniospores globoid or flattened-globoid, 19–23 μ broad by 18–22 μ high; wall cinnamon-brown, thin, 1–1.5 μ, moderately or closely echinulate, the pores 2–4, approximately equatorial.

III. Telia hypophyllous, scattered or somewhat grouped, round, 0.1–0.3 mm. in diameter, early naked, pulvinate, pale chestnut-brown, cinereous from germination, ruptured epidermis inconspicuous; teliospores ellipsoid or ellipsoid-clavate, 14–21 by 39–57 μ, rounded above, rounded or narrowed below, constricted at septum; wall colorless or pale cinnamon-brown, thin, 1 μ or less, thickened over the germ-pores into a colorless umbo, 3–7 μ, smooth; pedicel colorless, fragile, about length of spore.

ON LAMIACEAE:
Hyptis polystachya H.B.K. (*Mesosphaerum polystachyum* Cook & Collins), Costa Rica.
TYPE LOCALITY: Dept. Magdalena near El Blanco, Colombia, alt. 110 m., on *Hyptis mutabilis spicata*.
DISTRIBUTION: Costa Rica; also in South America.
ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. **5**: *f. 27*.

212. **Dicaeoma caulicola** (Tracy & Gall.) Kuntze, Rev. Gen. **3**[3]: 468. 1898.

Puccinia nigrescens Peck, Bot. Gaz. **3**: 35. 1878. Not *P. nigrescens* Kirchn. 1856.
Puccinia caulicola Tracy & Gall. Jour. Myc. **4**: 20. 1888.
Dicaeoma Salviae Kuntze, Rev. Gen. **3**[3]: 467. 1898.
Dicaeoma nigrescens Kuntze, Rev. Gen. **3**[3]: 469. 1898.
Puccinia Salviae-lanceolatae Bubák, in Sydow, Monog. Ured. **1**: 294. 1902.

O. Pycnia amphigenous on spots with or opposite aecia, brownish, flattened-globoid, 100–125 μ wide by 80–95 μ high; ostiolar filaments up to 55 μ long.

I. Aecia chiefly hypophyllous, gregarious, usually on brownish spots 3–10 mm. across, short-cylindric, 0.2–0.4 mm. in diameter; peridium white, fragile; peridial cells rhomboidal or rectangular in longitudinal radial section, 15–16 by 30–45 μ, broadly elliptic in face view, 29–39 μ wide, abutted or somewhat overlapping, the walls 2.5–3 μ thick, the outer smooth, the inner rather sparsely and finely verrucose; aeciospores angularly globoid or ellipsoid, 16–21 by 19–26 μ; wall pale or hyaline, rather thin, 1–2 μ, very closely and finely verrucose.

II. Uredinia amphigenous, numerous, scattered, roundish, small, 0.2–0.6 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; urediniospores oblate-spheroid, 19–23 μ broad by 16–20 μ wide; wall golden- or cinnamon-brown, 1–1.5 μ thick, moderately and finely echinulate, the pores 2 or 3, subequatorial.

III. Telia amphigenous or caulicolous, numerous, scattered, sometimes confluent, roundish or oval, small, 0.3–1 mm. across, early naked, compact, becoming pulverulent, blackish-brown, ruptured epidermis not noticeable; teliospores oblong or oblong-clavate, 16–26 by 29–48 μ, on stems generally over 35 μ long, rounded or obtuse above, rounded or narrowed below, slightly constricted at septum; wall chestnut-brown, 2–3 μ thick, thickened at apex, 6–10 μ, closely and minutely verrucose; pedicel pale, persistent, two or three times as long as spore, or on leaves shorter, the wall 1–3 μ thick.

ON LAMIACEAE:
Salvia lanceifolia Poir. (*S. lanceolata* Willd. not Lam.), Colorado, Iowa, Kansas, Nebraska, New Mexico, South Dakota, Texas; Hidalgo.
TYPE LOCALITY: Colorado, on *Salvia lanceolata*.
DISTRIBUTION: The plains of South Dakota southward into Mexico.
ILLUSTRATION: Sydow, Monog. Ured. 1: *f. 276*.
EXSICCATI: Barth. N. Am. Ured. *27, 335, 536, 627, 1534, 1535;* Clements, Crypt. Form. Colo. *552;* Ellis, N. Am. Fungi *1458, 1459;* Ellis & Ev. Fungi Columb. *1071, 1185, 1848, 1849;* D. Griff. W. Am. Fungi *275;* Kellerm. & Swingle, Kans. Fungi *43a;* Sydow, Ured. *1075, 1815*.

213. **Dicaeoma salviicola** (Dietel & Holway) Arthur.

Puccinia salviicola Dietel & Holway; Holway, Bot. Gaz. **24**: 33. 1897.
Uredo Salviarum Mayor, Mém. Soc. Neuch. Sci. Nat. **5**: 592. 1913.

O. Pycnia epiphyllous, crowded on brown or yellow spots opposite the aecia, conspicuous, chestnut-brown, globoid, 110–130 μ in diameter; ostiolar filaments up to 130 μ long.

I. Aecia hypophyllous, crowded on brown or yellow spots 1–3 mm. in diameter, short-cylindric, 0.2–0.5 mm. in diameter by 0.5–0.7 mm. high; peridium pale cinnamon-brown, the margin erose, fragile; peridial cells rhomboidal or rectangular in radial longitudinal section, 15–19 by 32–48 μ, oblong or elliptic-oblong in face view, 16–19 μ wide, abutted, the walls 2.5–3.5 μ thick, the outer smooth, the inner finely verrucose; aeciospores ellipsoid or narrow-obovoid, 13–21 by 24–32 μ; wall light cinnamon-brown, 1–2.5 μ thick, finely and very closely verrucose.

II. Uredinia amphigenous, numerous, scattered evenly over leaf-surface, round or oblong, 0.3–1 mm. in diameter, at first covered by the epidermis, becoming somewhat pulverulent later, cinnamon-brown, ruptured epidermis conspicuous; urediniospores obovoid, globoid or broadly ellipsoid, 19–24 by 21–29 μ; wall golden- or cinnamon-brown, 1.5–2 μ thick, moderately and closely echinulate, the pores 2 or 3, equatorial.

III. Telia amphigenous, rather numerous, scattered, round or elliptic, 0.5–1 mm. in diameter, somewhat tardily naked, compact, pulvinate at first, becoming somewhat pulverulent later, dark chestnut- or blackish-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid, 26–32 by 32–45 μ, rounded above and below, slightly or not constricted at septum; wall chestnut-brown, laminated, 3–6 μ thick, in some collections 3–3.5 μ, thickened over the apical pore into a semi-hyaline umbo, 5–10 μ thick, closely and very finely and inconspicuously verrucose, often appearing smooth; pedicel hyaline, 7–9 μ broad above, tapering somewhat, about twice length of spore, thin-walled.

ON LAMIACEAE:
Salvia coccinea Juss., Florida, Texas.
Salvia hypoglauca Briq., Hidalgo.
Salvia prunelloides H.B.K., Mexico (state).
Salvia sp., Puebla.
TYPE LOCALITY: Near City of Mexico, Mexico, on "*Salvia glechomaefolia*," error for *S. prunelloides*.
DISTRIBUTION: Southern Florida and Texas southward into Mexico; also in South America.
EXSICCATI: Barth. N. Am. Ured. *59, 1469*.

214. **Dicaeoma farinaceum** (Long) Arthur.

Puccinia farinacea Long, Bull. Torrey Club **29**: 115. 1902.

O. Pycnia epiphyllous, crowded in small groups 0.5–0.8 mm. in diameter, noticeable, dark chestnut-brown, globoid, 100–138 by 100–128 μ; ostiolar filaments 64–74 μ long, usually agglutinated into a column.

I. Aecia mostly hypophyllous, crowded in small groups 1–5 mm. across, cylindric, 0.2–0.5 mm. in diameter, 0.5–0.8 mm. high; peridium pale cinnamon-brown, the margin somewhat erose; peridial cells rhomboidal or rectangular in radial longitudinal section, 13–15 by 32–45 μ, oblong or elliptic-oblong in face view, 10–19 μ wide, abutted, the outer wall 3–4 μ thick, smooth, the inner wall 2–3 μ thick, verrucose; aeciospores angular, globoid, ellipsoid or oblong, 15–21 by 19–32 μ; wall light cinnamon-brown or colorless, 1–2 μ thick, very closely and finely but prominently verrucose.

II. Uredinia usually hypophyllous, scattered, round or oval, 0.1–0.8 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; urediniospores variable, oblate-spheroid, 20–25 μ broad by 16–21 μ high, or globoid or obovoid, 16–21 by 20–23 μ; wall pale or dark cinnamon-brown, 1–2 μ thick, moderately and finely or prominently echinulate, the pores 2 or 3, subequatorial or sometimes equatorial.

III. Telia usually hypophyllous, scattered or sometimes crowded into small groups, round, 0.3–1.5 mm. across, rather early naked, becoming pulverulent, chestnut- or chocolate-brown, ruptured epidemis conspicuous; teliospores broadly ellipsoid, 21–28 by 27–35 μ, occasionally up to 39 μ long, rounded above and below, not or slightly constricted at septum; wall dark cinnamon- or light chestnut-brown, 2–3 μ thick, thickened at apex, 5–7 μ, moderately verrucose with markings uniting in short lines giving a coarsely verrucose or sometimes a faintly reticulate appearance; pedicel colorless, persistent, up to 60 μ long, the wall thin, 1 μ or less.

ON LAMIACEAE:
Salvia amarissima Ortega, Hidalgo, Michoacan, Oaxaca; Guatemala.
Salvia elegans Vahl, Mexico (state); Guatemala.
Salvia farinacea Benth., Texas.
Salvia Holwayi Standley, Guatemala.
Salvia lavanduloides H.B.K., Guatemala.
Salvia Lindenii Benth., Guatemala.
Salvia nepetoides H.B.K., Guatemala.
Salvia Pitcheri Torr. (*S. azurea grandiflora* Benth.), Kansas, Nebraska, Oklahoma.
Salvia vitifolia Benth., Oaxaca.

TYPE LOCALITY: Austin, Texas, on *Salvia farinacea*.
DISTRIBUTION: Kansas south through Mexico to Guatemala.
ILLUSTRATION: Bull. Torrey Club **29**: *pl. 15, f. 6*.
EXSICCATI: Barth. Fungi Columb. *2450, 3654;* Barth. N. Am. Ured. *631;* Ellis & Ev. Fungi Columb. *1867;* Ellis & Ev. N. Am. Fungi *1852;* Kellerm. & Swingle, Kans. Fungi *43b*.

215. **Dicaeoma** (?) **Ballotaeflorae** (Long) Arthur.

Puccinia Ballotaeflorae Long, Bull. Torrey Club **29**: 116. 1902.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round or oblong, 0.2–0.8 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores triangular-obovoid or broadly obovoid, 19–23 by 23–26 μ; wall cinnamon-brown, 1.5–2 μ thick, closely or moderately and finely echinulate, the pores 3 or 4, 2 slightly subequatorial, and 1 or sometimes 2 apical.

III. Telia amphigenous, scattered, round or oblong, 0.2–0.8 mm. long, early naked, becoming pulverulent, blackish-brown, ruptured epidermis inconspicuous; teliospores ellipsoid or oblong, 23–27 by 32–43 μ, rounded above and below, slightly constricted at septum; wall dark chestnut- or chocolate-brown, 2–3.5 μ thick, thickened over the germ-pores into a concolorous or slightly lighter umbo, 5–7 μ, moderately and coarsely verrucose; pedicel colorless or somewhat tinted next the spore, 50–70 μ long, thin-walled.

ON LAMIACEAE:
Salvia ballotaeflora Benth., Texas.
TYPE LOCALITY: San Marcos, Texas, on *Salvia ballotaeflora*.
DISTRIBUTION: Central to southern Texas.
EXSICCATI: Barth. N. Am. Ured. *2141*.

216. **Dicaeoma badium** (Holway) Arthur.

Puccinia badia Holway, Jour. Myc. **11**: 158. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, rather numerous, scattered, round, very small, 0.1 mm. in diameter or less, early naked, pulverulent, pale cinnamon-brown, ruptured epidermis inconspicuous; urediniospores usually broadly obovoid with pores in surface view, triangular-obovoid with pores in optical section, 16–23 by 16–24 μ; wall pale cinnamon-brown, thin, 1–1.5 μ, finely and closely or moderately echinulate, the pores rather indistinct, 2, somewhat subequatorial.

III. Telia hypophyllous, numerous, scattered, round or irregular, small, 0.1 mm. across, early naked, pulverulent, dark chocolate-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid, 19–24 by 23–32 μ, rounded above and below, slightly constricted at septum; wall dark chestnut-brown, 2.5–3.5 μ thick, uniform, moderately and somewhat coarsely verrucose; pedicel persistent, hyaline, up to 50 μ long, often attached obliquely or in a line with the septum.

ON LAMIACEAE:
Salvia albicans Fernald, Guerrero.
TYPE LOCALITY: Iguala, Mexico, on *Salvia albicans*.
DISTRIBUTION: Southeastern Mexico.

217. **Dicaeoma diutinum** (Mains & Holway) Arthur.

Puccinia diutina Mains & Holway; Arth. Mycologia 10: 136. 1918.

O. Pycnia epiphyllous, few, crowded on yellowish areas 1–2 mm. across, noticeable, light-brown, globoid, 98–190 by 103–190 μ; ostiolar filaments 80–100 μ long, more or less agglutinated into a column.

I. Aecia hypophyllous, crowded on yellowish spots opposite the pycnia, irregular, round or oblong, 0.8–1.5 mm. long, shallow, 0.1–0.2 mm. high; peridium white, the margin remaining more or less incurved, erose; peridial cells irregularly rectangular in radial longitudinal section, 13–21 by 26–51 μ, abutted or slightly overlapping, the outer wall 5–13 μ thick, striate, the inner wall 1.5 μ thick, closely and finely verrucose; aeciospores ellipsoid, globoid or oblong, 19–26 by 27–39 μ; wall colorless, thick, 2.5–5 μ, very finely and closely verrucose.

II. Uredinia amphigenous, scattered, round, 0.1–0.2 mm. in diameter, early naked, pulverulent, dark cinnamon- or chestnut-brown, ruptured epidermis rather inconspicuous; urediniospores oblate-spheroid or globoid, 19–24 by 18–23 μ; wall in the upper part of spore dark cinnamon- or light chestnut-brown, 2 μ thick, becoming rather abruptly colorless in the lower third of the spore and less than 1 μ thick, closely and finely echinulate, the pores 2 or 3, subequatorial, rather indistinct.

III. Telia amphigenous, scattered, round, 0.1–0.2 mm. in diameter, early naked, somewhat pulverulent, blackish-brown, ruptured epidermis rather inconspicuous; teliospores broadly ellipsoid, 23–26 by 25–33 μ, rounded at both ends, slightly or not constricted at septum; wall dark chestnut-brown, 2–3 μ thick, occasionally thickened up to 5 μ at apex, rather closely and coarsely verrucose; pedicel colorless, fragile, up to 55 μ long, sometimes laterally displaced.

ON LAMIACEAE:
Salvia chrysantha Mart. & Gal., Oaxaca.
Salvia Pittieri Briq. (?), Costa Rica.
Salvia scorodoniaefolia Poir., Jalisco.
TYPE LOCALITY: Slopes of Irazú above Cartago, Costa Rica, on *Salvia Pittieri* (?).
DISTRIBUTION: Southern Mexico and Costa Rica.

218. **Dicaeoma infrequens** (Holway) Arthur.

Puccinia infrequens Holway, Jour. Myc. 11: 158. 1905.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round, 0.3 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis not noticeable; urediniospores oblate-spheroid, 18–25 μ broad by 16–23 μ high, or globoid or obovoid, 18–20 by 20–25 μ; wall cinnamon-brown, 1–2 μ thick, moderately echinulate, the pores 2 or 3, subequatorial or approximately equatorial.

III. Telia hypophyllous, scattered, round or ovate, 0.2–0.5 mm. in diameter, early naked, pulverulent, chestnut-brown, ruptured epidermis not noticeable; teliospores ellipsoid, 20–26 by 27–35 μ, occasionally up to 39 μ long, rounded at both ends, slightly or not constricted at septum; wall dark cinnamon-brown, rather finely and closely verrucose, markings uniting irregularly in short lines, 1–2 μ thick, thickened into a semi-hyaline umbo at apex, 5–9 μ, the pore of the lower cell often about half way down; pedicel colorless, very short, thin-walled.

ON LAMIACEAE:
Salvia cinnabarina Mart. & Gal., Oaxaca; Guatemala.
TYPE LOCALITY: Oaxaca, Mexico, on *Salvia cinnabarina*.
DISTRIBUTION: Southern Mexico and Guatemala.
EXSICCATI: Barth. N. Am. Ured. *1453*.

219. **Dicaeoma mitratum** (Sydow) Arthur.

Puccinia mitrata Sydow, Monog. Ured. 1: 294. 1902.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, numerous, scattered or sometimes crowded in groups of two or three sori, round, minute, 0.1–0.4 mm. in diameter, early naked, very pulverulent, cinna-

mon-brown, ruptured epidermis noticeable; urediniospores globoid, broadly ellipsoid or obovoid, 16–21 by 18–23 μ; wall cinnamon-brown, 1–2 μ thick, closely or moderately echinulate, the pores 2 or 3, subequatorial or approximately equatorial.

III. Telia usually hypophyllous, numerous, scattered or sometimes crowded in groups of two to four sori, round, small, 0.3–1 mm. in diameter, early naked, loosely pulvinate at first, becoming pulverulent, blackish-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid, 26–32 by 32–42 μ, rounded above and below, slightly constricted at septum; wall chestnut-brown, thick, 3–6 μ, thickened at apex into somewhat lighter umbo, 7–10 μ, prominently verrucose with markings uniting in short lines giving a coarsely verrucose appearance, or uniting to form more or less perfect reticulations; pedicel persistent, hyaline, broad, 7 μ, tapering downward somewhat, up to 90 μ long, thin-walled, 1–1.5 μ thick.

ON LAMIACEAE:
Salvia fluviatilis Fernald, Morelos.
Salvia mexicana L., Mexico (state), Michoacan.
Salvia polystachya Ortega, Mexico (state), Michoacan; Costa Rica; Guatemala.
Salvia purpurea Cav., Jalisco, Oaxaca; Guatemala.
Salvia sessilifolia Baker, Jalisco.
Salvia tiliaefolia Vahl, Michoacan.
TYPE LOCALITY: Patzcuaro, Michoacan, on *Salvia mexicana*.
DISTRIBUTION: Throughout the southern half of Mexico and in Guatemala.
EXSICCATI: Barth. N. Am. Ured. *247, 1561*.

220. **Dicaeoma gentile** Arthur.

Puccinia gentilis Arth. Bull. Torrey Club **46**: 118. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round or elliptic, 0.3–0.8 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores oblate-spheroid, 23–26 μ broad by 19–24 μ, high, or globoid to obovoid, 21–23 by 21–28 μ; wall dark cinnamon-brown, 1.5–2 μ thick, moderately and strongly echinulate, the pores 2 or 3, subequatorial or approximately equatorial.

III. Telia hypophyllous, scattered, round, 0.3–0.8 mm. in diameter, early naked, becoming pulverulent, blackish-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid, 27–32 by 35–45 μ, rounded above and below, not constricted at septum; wall dark chestnut- or chocolate-brown, thick, 3–5 μ, thickened over the germ-pore into a yellowish umbo, 7–10 μ thick, moderately verrucose with markings uniting into short irregular lines giving a coarsely verrucose appearance; pedicel colorless, up to 100 μ long, with thin walls, 1 μ or less.

ON LAMIACEAE:
Salvia alamosana Rose, Oaxaca.
TYPE LOCALITY: Oaxaca Mexico, on *Salvia* sp.
DISTRIBUTION: Oaxaca.

221. **Dicaeoma prosperum** Arthur.

Puccinia prospera Arth. Bull. Torrey Club **46**: 118. 1919.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, round, 0.2–0.8 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores oblate-spheroid, 25–30 μ broad by 20–32 μ high; wall cinnamon-brown, 1.5 μ thick, moderately and rather strongly echinulate, the pores 2 or 3, subequatorial.

III. Telia hypophyllous, scattered, round, 0.2–0.8 mm. in diameter, early naked, pulverulent, chestnut-brown, ruptured epidermis evident; teliospores broadly ellipsoid, 27–32 by 35–40 μ, rounded above and below, not constricted at septum; wall chestnut-brown, rather thin, 1–2.5 μ, thickened over the pores, 5–7 μ, obscurely verrucose-rugose; pedicel colorless, fragile, up to 60 μ long, thin-walled.

ON LAMIACEAE:
Salvia microphylla H.B.K., Hidalgo, Mexico (state).
TYPE LOCALITY: Pachuca, Mexico, on *Salvia microphylla*.
DISTRIBUTION: Southern Mexico.

222. **Dicaeoma filiolum** (Mains & Holway) Arthur.

Puccinia filiola Mains & Holway; Arth. Am. Jour. Bot. 5: 482. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered, round, minute, 0.1–0.2 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores oblate-spheroid, 23–27 μ broad by 19–23 μ high, or triangular-obovoid, obovoid, or globoid, 21–23 by 23–26 μ; wall dark cinnamon-brown, 1.5–2 μ thick, moderately and strongly echinulate, the pores 2 or 3, subequatorial.

III. Telia usually hypophyllous, scattered, round, minute, 0.1–0.2 mm. in diameter, early naked, pulverulent, dark chestnut-brown, ruptured epidermis inconspicuous; teliospores oblong or ellipsoid, 23–29 by 35–51 μ, rounded above and below, not constricted at septum; wall chestnut-brown, 2–3.5 μ thick, thickened over the pores into a low yellowish umbo, 5–7 μ, moderately verrucose with the markings often uniting in short irregular lines giving a coarsely verrucose appearance to the spore; pedicel colorless, up to 130 μ long, thin-walled, 1 μ or less.

ON LAMIACEAE:
Salvia involucrata Cav., Guatemala.
Salvia pulchella DC., Guatemala.
TYPE LOCALITY: Totonicapam, Guatemala, on *Salvia involucrata*.
DISTRIBUTION: Guatemala; also in South America.

223. **Dicaeoma Anisacanthi** (Peck) Arthur.

Aecidium Anisacanthi Peck, Bull. Torrey Club 10: 75. 1883.
Puccinia Anisacanthi Dietel & Holway; Holway, Bot. Gaz. 31: 329. 1901.

O. Pycnia amphigenous, scattered among the aecia, brownish, flask-shaped, 80–100 μ in diameter by 95–130 μ high; ostiolar filaments 30–50 μ long.

I. Aecia amphigenous, sometimes caulicolous, causing distortion, short-cylindric, 0.2–0.4 mm. across; peridium whitish, the margin erect, lacerate; peridial cells rectangular, 19–26 by 30–40 μ, slightly overlapping, the walls 3–6 μ, the outer striate, the inner verrucose; aeciospores globoid or irregular, 15–23 by 23–32 μ; wall yellowish, 1.5–2 μ thick, closely verrucose.

II. Uredinia amphigenous, scattered, roundish, small, 0.2–0.5 mm. across, rather early naked, pulverulent, brownish; urediniospores broadly ellipsoid or obovoid, 19–25 by 22–29 μ; wall golden-brown, 1–2 μ thick, moderately echinulate, the pores 2 or 3, equatorial.

III. Telia amphigenous, scattered, roundish, 0.3–1 mm. across, early naked, pulverulent, chocolate-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 26–32 by 39–48 μ, rounded at both ends, slightly constricted at septum; wall chestnut-brown, thick, 3–5 μ, thicker at apex with a broad lighter umbo, 7–11 μ, obscurely reticulate with meshes 1–1.5 μ in diameter appearing minutely and moderately verrucose in optical section; pedicel pale, two to three times as long as spore, often inserted laterally, roughened below.

ON ACANTHACEAE:
Anisacanthus Thurberi A. Gray, Arizona.
Anisacanthus virgularis Nees, Oaxaca, San Luis Potosí.
Anisacanthus Wrightii (Torr.) A. Gray, Chihuahua, Guanajuato (?).
TYPE LOCALITY: Arizona, on *Anisacanthus Thurberi*.
DISTRIBUTION: Mexico and southern border of the United States.
EXSICCATI: Pringle, Mexican Fungi *7;* Sydow, Ured. *2015*.

224. **Dicaeoma Ruelliae** (Berk. & Br.) Kuntze, Rev. Gen. 3^3: 470. 1898.

Uredo Ruelliae Berk. & Br. Jour. Linn. Soc. 14: 92. 1873.
Puccinia lateripes Berk. & Rav.; Berk. Grevillea 3: 52. 1874.
Uromyces texensis Berk. & Curt.; Berk. Grevillea 3: 56. 1874.
Diorchidium lateripes Magnus, Ber. Deuts. Bot. Ges. 9: 191. 1891.
Puccinia Ruelliae Lagerh. Tromsö Mus. Aarsh. 17: 71. 1895.
Puccinia Blechi Lagerh.; Pat. & Lagerh. Bull. Soc. Myc. Fr. 11: 214. 1895.
Dicaeoma lateripes Kuntze, Rev. Gen. 3^3: 469. 1898.
Aecidium Tracyanum Sydow, Hedwigia Beibl. 40: 129. 1901.
Puccinia Ruelliae Bourgaei Dietel & Holway, Bot. Gaz. 31: 329. 1901.
Puccinia Longiana Sydow, Hedwigia Beibl. 40: 126. 1901.
Aecidium lateripes Kellerm. Jour. Myc. 9: 234. 1903.
Uredo balaensis Sydow, Ann. Myc. 1: 21. 1903.

O. Pycnia amphigenous or caulicolous, in loose groups on spots with the aecia, inconspicuous, brownish, globoid or flask-shaped, 90–120 μ in diameter by 80–110 μ high; ostiolar filaments dense, 15–35 μ long.

I. Aecia caulicolous or amphigenous, causing distortion of the stem, on spots on the leaves, cylindric, 0.2–0.3 mm. in diameter by 0.3–0.6 mm. high; peridium white, delicate, often becoming ruptured near the base and resulting in the aecia appearing short and cupulate, the margin irregular, lacerate; peridial cells ellipsoid or oblong, 18–24 by 32–44 μ, overlapping, the walls 3–5 μ thick, verrucose; aeciospores ellipsoid, 15–21 by 20–30 μ; wall pale-yellow, 1–2 μ thick, closely verrucose.

II. Uredinia amphigenous, numerous, scattered or irregularly clustered, roundish, small, 0.1–0.7 mm. across, rather early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 16–24 by 22–32 μ (southern forms up to 26 by 37 μ); wall cinnamon-brown, 1.5–2.5 μ thick, moderately and strongly echinulate, the pores 2, equatorial.

III. Telia amphigenous, sometimes also caulicolous and fructicolous, numerous, scattered or clustered, roundish, small, 0.2–0.8 mm. across, early naked, pulverulent, chocolate-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 19–29 by 31–41 μ, rounded at both ends, scarcely constricted at septum; wall chestnut-brown, uniformly thick, 2–3.5 μ, faintly rugose in short lines uniting to form reticulations appearing moderately and finely verrucose in optical section; pedicel usually inserted laterally, pale, roughened below, once to thrice length of spore.

ON ACANTHACEAE:
Blechum Brownei (Sw.) Juss., Costa Rica; Guatemala; Cuba; Martinique; Porto Rico.
Justicia sp., Costa Rica; Guatemala.
Ruellia Bourgaei Hemsl., Jalisco.
Ruellia ciliosa Pursh, District of Columbia, Illinois, Indiana, Kansas, Missouri, West Virginia.
Ruellia nudiflora (Engelm. & Gray) Urban, Texas.
Ruellia paniculata L., Jamaica.
Ruellia strepens L., Arkansas, Illinois, Indiana, Kansas, Kentucky, Missouri, Ohio, Tennessee, Texas.
Ruellia tuberosa L. (*R. clandestina* L.), Texas; Jamaica.
Ruellia sp., Guerrero.
TYPE LOCALITY: Ceylon, on *Ruellia prostrata*.
DISTRIBUTION: Ohio and West Virginia to Kansas and Texas, southward through Central America and the West Indies; also in South America and Asia.
ILLUSTRATIONS: Ber. Deuts. Bot. Ges. **9**: *pl. 9, f. 38–47;* Jour. Myc. **9**: *pl. 2;* Jahrb. Wiss. Bot. **26**: *pl. 4: f. 11.*
EXSICCATI: Barth. Fungi Columb. *2563, 2667, 2857, 3847, 4855, 4966;* Barth. N. Am. Ured. *456, 467, 1057, 1455, 1948, 2046, 2252;* Carleton, Ured. Am. *42;* Ellis & Ev. Fungi Columb. *259;* Ellis, Am. Fungi *1055a, b;* Kellerm. Ohio Fungi *130, 131;* Seym. & Earle, Econ. Fungi Suppl. *B15a, b;* Sydow, Ured. *1374, 1531.*

225. **Dicaeoma** (?) **varium** (Dietel) Arthur.

Uredo varia Dietel, Hedwigia **36**: 35. 1897.
Puccinia varia Arth. Am. Jour. Bot. **5**: 487. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, round or oblong, 0.2–1 mm. across, somewhat tardily naked, pulverulent, golden-brown, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 21–24 by 27–34 μ; wall golden-brown, rather thin, 1–1.5 μ, moderately and prominently echinulate, the pores 2, equatorial.

III. Telia epiphyllous, scattered, round, about 0.3 mm. in diameter, chestnut-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid, 24–29 by 39–45 μ, rounded above and below, slightly or not constricted at septum; wall chestnut-brown, 2–3 μ thick, slightly thickened at apex, 5–6 μ, smooth; pedicel tinted, up to 55 μ long.

ON ACANTHACEAE:
Ruellia or *Jacobina* sp.?, Guatemala.
TYPE LOCALITY: Rio de Janeiro, Brazil, on an Acanthaceous host.
DISTRIBUTION: Guatemala; also in South America.

226. **Dicaeoma Tetramerii** (Seym.) Arthur.

Puccinia Tetramerii Seym.; Pringle, Mex. Fungi *9*. 1896.

O. Pycnia amphigenous, grouped on brownish spots 2–4 mm. across, noticeable, cinnamon- or chocolate-brown, globoid, 112–147 μ in diameter; ostiolar filaments 112–128 μ long.

I. Aecia amphigenous, circinating about the pycnia, cupulate, 0.2–0.3 mm. in diameter, 0.2–0.3 mm. high; peridium white, the margin erose, soon broken away; peridial cells narrowly rhomboidal in radial longitudinal section, 9–10 by 32–37 μ, abutted, the outer wall 3 μ thick, closely and finely verrucose, the inner wall 1.5 μ, closely and finely verrucose; aeciospores angularly ellipsoid or globoid, 18–21 by 24–32 μ; wall colorless, 2 μ thick, very closely and finely verrucose.

II. Uredinia hypophyllous, few, scattered, oval, 0.1–0.3 mm. long, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores obovoid, triangular-obovoid, or ellipsoid, 18–24 by 23–29 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately echinulate, the pores 2, equatorial.

III. Telia amphigenous, scattered, oval or oblong, 0.3–1 mm. long, early naked, somewhat pulverulent, dark chocolate-brown, ruptured epidermis evident; teliospores broadly ellipsoid, 24–30 by 35–42 μ, rounded above and below, not constricted at septum; wall dark chestnut- or chocolate-brown, thick, 3–5 μ, lighter-colored and thickened at apex, 6–10 μ, obscurely reticulate with meshes 2–3 μ across, appearing moderately and very coarsely verrucose in optical section; pedicel colorless, sometimes pale-brown and swollen into a collar next the spore, 50–80 μ long.

ON ACANTHACEAE:
Acanthaceae gen. & sp. indet., Guerrero.
Tetramerium aureum Rose, Jalisco, Oaxaca, Puebla.
Tetramerium hispidum Nees, Arizona.
TYPE LOCALITY: Tomellin Cañon, Oaxaca, on *Tetramerium aureum*.
DISTRIBUTION: Southern Mexico.
EXSICCATI: Barth. N. Am. Ured. *769;* Pringle, Mex. Fungi *9*.

227. **Dicaeoma punctatum** (Link) Arth. Proc. Ind. Acad. Sci. **1903**: 150. 1904.

Puccinia punctata Link, Ges. Nat. Freunde Berlin Mag. **7**: 30. 1815.
Puccinia Galii Schw. Schr. Nat. Ges. Leipzig **1**: 73. 1822.
Caeoma Galii Schlecht. Fl. Berol. **2**: 115. 1824.
Caeoma galiatum Link, in Willd. Sp. Pl. 6^2: 52. 1825.
Puccinia Galiorum Link, in Willd. Sp. Pl. 6^2: 76. 1825.
Uredo Galii-veri Cast. Obs. Myc. **1**: 28. 1842.
Aecidium Friesii Bubák, Sitz.-ber. Böhm. Ges. Wiss. 1898^{28}: 16. 1898.
Dicaeoma Galiorum Arth. Proc. Ind. Acad. Sci. **1898**: 182. 1899.
Puccinia chondroderma Lindr. Medd. Stockh. Högsk. Bot. Inst. 4^9: 6. 1901.

O. Pycnia epiphyllous, in small groups of a few only, globoid, 80–110 μ in diameter by 85–130 μ high; ostiolar filaments short.

I. Aecia hypophyllous, in small groups, 1–2 mm. across, cupulate, small, 0.2–0.3 mm. in diameter; peridium colorless, fragile, the margin erect, finely erose; peridial cells rhombic, 18–26 by 24–32 μ, abutted, the outer wall thick, 7–9 μ, smooth, transversely striate, the inner wall thinner, 3–5 μ, coarsely verrucose; aeciospores globoid or ellipsoid, 15–21 by 18–24 μ; wall colorless, thin, about 1 μ, finely and closely verrucose.

II. Uredinia amphigenous, scattered, round, small, 0.2–0.5 mm. in diameter, pulvinate, pulverulent, cinnamon-brown; urediniospores globoid, ellipsoid, or obovoid, 16–23 by 23–30 μ; wall light cinnamon-brown, moderately thin, 1.5–2 μ, moderately and rather prominently echinulate, the pores 2, superequatorial.

III. Telia chiefly epiphyllous, scattered, round, small, 0.2–0.5 mm. in diameter, rather compact, pulvinate, chocolate-brown; teliospores ellipsoid or clavate, 16–26 by 37–56 μ, rounded, truncate or angular above, narrowed below, slightly constricted at septum; wall cinnamon- or chestnut-brown, moderately thin, 1–2 μ, much thickened at apex, up to 15 μ, smooth; pedicel slightly tinted or colorless, fragile, once length of spore or less.

ON RUBIACEAE:
Galium Aparine L., Oregon, Washington.
Galium asperrimum A. Gray, Arizona, New Mexico, Oregon, Washington.
Galium asprellum Michx., Connecticut, Illinois, Iowa, Minnesota, New York, Wisconsin, Nova Scotia, Ontario.

Galium buxifolium Greene, California.
Galium concinnum T. & G., Illinois, Indiana, Iowa, Michigan, Missouri, Wisconsin.
Galium pilosum Ait. (*G. purpureum* Walt.), North Carolina.
Galium tinctorium L., Indiana, Wisconsin.
Galium trifidum L., Wisconsin.
Galium triflorum Michx., California, Idaho, Oregon, Utah, Washington.
Galium uncinulatum DC., Costa Rica.
Galium sp., Michoacan.

TYPE LOCALITY: Europe, on *Galium paludosum*.

DISTRIBUTION: Found over the greater portion of North America, but rare east of the Mississippi valley; also in South America, Europe, and Asia.

ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 243–246;* Ann. Rep. N. Y. State Mus. **25**: *pl. 2, f. 18;* Krypt.-fl. Brand. Pilze **3**: *f. B153.*

EXSICCATI: Barth. Fungi Columb. *2572, 3963;* Barth. N. Am. Ured. *166, 862, 962, 1071, 1862, 2261;* Ellis, N. Am. Fungi *1038b;* Garrett, Fungi Utah. *114;* Sydow, Ured. *1310, 1779, 2037.*

228. **Dicaeoma troglodytes** (Lindr.) H. S. Jackson, Proc. Ind. Acad. Sci. **1915**: 461. 1916.

Puccinia troglodytes Lindr. Medd. Stockh. Högsk. Bot. Inst. 4^9: 6. 1901.

O and I. Pycnia and aecia not seen.

II. Uredinia amphigenous, scattered, round, 0.2–0.5 mm. in diameter, somewhat tardily naked, bullate, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or globoid, 16–22 by 19–27 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately echinulate, the pores 2 or 3, equatorial.

III. Telia amphigenous, scattered, round, 0.2–0.5 mm. in diameter, somewhat tardily naked, compact, pulvinate, chocolate-brown, ruptured epidermis conspicuous; teliospores clavate or clavate-oblong, 14–19 by 27–40 μ, rounded above, narrowed below, somewhat constricted at septum; wall light chestnut-brown, darker above, thin, 1–1.5 μ, thickened at the apex, 6–12 μ, smooth; pedicel colorless, fragile.

ON RUBIACEAE:
Galium triflorum Michx., Connecticut, Indiana, Iowa, Missouri, New Hampshire, New York, North Dakota, Pennsylvania, South Dakota, Washington, West Virginia.

TYPE LOCALITY: Perryville, [Missouri], on *Galium triflorum*.

DISTRIBUTION: Northern United States, east of the Rocky Mountains.

EXSICCATI: Barth. N. Am. Ured. *1376*.

229. **Dicaeoma eximium** (Arth. & Holway) Arthur.

Puccinia eximia Arth. & Holway; Arth. Am. Jour. Bot. **5**: 488, 1918.

O. Pycnia not seen.

I. Aecia amphigenous, more or less scattered upon rather indefinite yellowish areas, short-cylindric, 0.2–0.5 mm. high, 0.2–0.4 mm. in diameter; peridium white, the margin erose, soon breaking away; peridial cells rhombic or rhomboidal, 16–23 by 23–40 μ, slightly overlapping, the outer wall 3–7 μ thick, transversely striate, the inner wall 2.5–5 μ thick, verrucose; aeciospores irregularly globoid or ellipsoid, 18–21 by 19–24 μ; wall colorless, thin, 1–1.5 μ, finely and closely verrucose.

II. Uredinia hypophyllous, scattered, oval or oblong, 0.6–1 mm. long, somewhat tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 21–29 by 32–35 μ; wall dark cinnamon-brown, moderately thick, 2–3 μ, moderately and coarsely echinulate, the pores 2 or 3, superequatorial.

III. Telia hypophyllous, scattered or in small groups about 2 mm. across, oval, 0.6–0.8 mm. long, early naked, compact, dark chestnut-brown, ruptured epidermis evident; teliospores oblong, clavate-oblong or clavate-ellipsoid, 21–27 by 42–58 μ, rounded at apex, rounded or somewhat narrowed below, somewhat constricted at septum; wall golden- or pale chestnut-brown, 1.5–2 μ thick, thickened at apex, 5–12 μ, smooth; pedicel colorless, about as long as spore, tapering somewhat toward the base.

ON RUBIACEAE:
Galium mexicanum H.B.K. (?), Guatemala.

TYPE LOCALITY: Quezaltenango, Guatemala, on *Galium* sp.

DISTRIBUTION: Known only from the type locality.

230. **Dicaeoma splendens** (Vize) Kuntze, Rev. Gen. 3[3]: 470. 1898.

Puccinia splendens Vize, Grevillea 7: 11. 1878.
Puccinia notabilis Tracy & Earle, Bull. Torrey Club 22: 174. 1895.
Puccinia Franseriae Sydow, Ann. Myc. 1: 326. 1903.
Allodus splendens Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, numerous, scattered, noticeable, globoid, 96–112 μ; ostiolar filaments 70–80 μ long.

I. Aecia amphigenous, crowded on yellowish spots, short-cylindric; peridium yellowish, the margin lacerate; peridial cells rhombic, 15–19 by 31–34 μ, overlapping, the outer wall smooth, 4–5 μ thick, the inner wall closely and roughly verrucose with slender tubercles, 7–9 μ thick; aeciospores angularly ellipsoid, 15–19 by 23–29 μ; wall colorless, 1.5 μ thick, minutely and obscurely verrucose.

II. Uredinia amphigenous or caulicolous, scattered on leaves, crowded or confluent on stems, early naked, compact, cinnamon- or chestnut-brown, ruptured epidermis conspicuous; urediniospores appearing round, elliptic or broadly obovate with pores in surface view, 24–29 by 27–34 μ, and flattened laterally, appearing oblong with pores in optical section, 14–16 μ thick; wall dark cinnamon-brown, 1–2 μ thick, finely and moderately echinulate, with obscure smooth area somewhat depressed on flat sides around pores, the pores 2, equatorial.

III. Telia amphigenous and caulicolous, numerous, scattered on leaves, confluent on stems, producing gall-like swellings, often fusiform, 3–6 cm. long, early naked, compact, pulvinate, dark chestnut-brown or blackish, ruptured epidermis inconspicuous; teliospores ellipsoid or obovoid, 27–32 by 39–50 μ on leaves, larger on stems, 28–36 by 46–62 μ, rounded at both ends, slightly constricted at septum; wall chestnut-brown, 2.5–5 μ thick, thicker at apex, 7–10 μ, smooth; pedicel colorless or slightly tinted especially in upper part, variable in length, often very long, up to 230 μ, flexuous.

ON AMBROSIACEAE:
Franseria ambrosioides Cav. (*Gaertneria ambrosioides* Kuntze), Arizona.
Franseria deltoidea Torr. (*Gaertneria deltoidea* Kuntze), Arizona.
Franseria dumosa A. Gray, California.
Hymenoclea monogyra T. & G., Arizona, California, New Mexico, Texas.
Hymenoclea Salsola T. & G., Arizona, California.
TYPE LOCALITY: California on "onion or rabbit bush" [*Hymenoclea* sp.]
DISTRIBUTION: Southwestern United States from California to Texas.
EXSICCATI: Barth. N. Am. Ured. *2266:* Ellis, N. Am. Fungi *1061;* D. Griff. W. Am. Fungi *257, 375.*

231. **Dicaeoma** (?) **Xanthiifoliae** (Ellis & Ev.) Kuntze, Rev. Gen. 3[3]: 471. 1898.

Puccinia Xanthiifoliae Ellis & Ev. Jour. Myc. 6: 120. 1891.

O and I. Pycnia and aecia unknown.

II. Uredinia mostly hypophyllous, numerous, scattered, round, small, 0.1–0.3 mm. in diameter, early naked, pulverulent, cinnamon- or light chestnut-brown, ruptured epidermis inconspicuous; urediniospores globoid or broadly ellipsoid, 19–24 by 21–26 μ; wall cinnamon-brown, 1–1.5 μ thick, closely echinulate, the pores 2, occasionally 3, subequatorial.

III. Telia mostly hypophyllous, numerous, scattered without order, round, 0.1–0.7 mm. in diameter, early naked, compact, tuberculiform, dark chestnut-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 23–27 by 35–48 μ, rounded above and below, moderately constricted at septum; wall chestnut-brown, 1.5–2.5 μ thick, thicker at apex, 7–9 μ, with a wide light cinnamon-brown umbo, smooth; pedicel colorless, up to 80 μ long, in large part deciduous.

ON AMBROSIACEAE:
Cyclachaena xanthifolia (Nutt.) Fresen. (*Iva xanthifolia* Nutt.), Arizona, Colorado, Idaho, Kansas, Nebraska, South Dakota.
TYPE LOCALITY: Manhattan, Kansas, on *Iva xanthifolia.*
DISTRIBUTION: Kansas and South Dakota westward to Colorado and Idaho.
EXSICCATI: Barth. N. Am. Ured. *2082;* Ellis & Ev. N. Am. Fungi *2252*[*a*]; Seym. & Earle, Econ. Fungi Suppl. *B21.*

232. *Dicaeoma Becki (Mayor) Arthur & Jackson.

Puccinia Becki Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 509. 1913.

O. Pycnia epiphyllous, few, gregarious on yellowish somewhat hypertrophied spots, 0.5–1 mm. across, frequently extending along veins, conspicuous, orange-yellow fading to blackish, globoid or flask-shaped, 112–120 by 125–130 μ; ostiolar filaments 50 μ long.

I. Aecia hypophyllous, few or solitary, in groups opposite the pycnia, cylindric; peridium white, membranous, lacerate; peridial cells seen only in face view, irregularly polyhedral, 16–23 by 26–32 μ, the wall colorless, thin, 1.5–2 μ, prominently verrucose-rugose; aeciospores globoid or ellipsoid, somewhat irregular, 16–22 by 23–34 μ; wall colorless, 2 μ thick, closely and prominently verrucose with low warts often arranged in longitudinal lines, especially near either end.

II. Uredinia amphigenous, chiefly hypophyllous, scattered, small, 0.2–0.5 mm. across, round, early naked, somewhat pulverulent, cinnamon-brown, ruptured epidermis not conspicuous; urediniospores globoid or broadly ellipsoid, 18–22 by 22–24 μ; wall pale cinnamon-brown, about 2 μ thick, moderately echinulate, the pores obscure.

III. Telia chiefly hypophyllous, scattered, small, 0.2–0.5 mm. across, round, early naked, compact, pulvinate, germinating at maturity, chestnut-brown, ruptured epidermis not conspicuous; teliospores cylindric or fusiform, 13–19 by 58–90 μ; wall cinnamon-brown, uniformly 1–1.5 μ thick, smooth; pedicel colorless, fragile, short, up to 40 μ long.

ON CARDUACEAE:
Vernonia divaricata Sw., Jamaica.
TYPE LOCALITY: Near Bogotá, Dep. Cundinamarca, Colombia, on *Vernonia Cotoneaster*.
DISTRIBUTION: Jamaica; also in South America.
ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: *509, f. 36*.

233. Dicaeoma erraticum (Jackson & Holway) Arthur & Jackson.

Dietelia Vernoniae Arth. Bot. Gaz. 40: 198. 1905. Not *Dicaeoma Vernoniae* Kuntze, 1898.
Endophyllum Vernoniae Arth. N. Am. Flora 7: 126. 1907.
Puccinia erratica Jackson & Holway; H. S. Jackson, Bot. Gaz. 65: 294. 1918.

O. Pycnia epiphyllous, numerous, in crowded groups 1 mm. across, in the center of yellowish spots 0.5–1 cm. in diameter, conspicuous, subepidermal, orange becoming blackish, globose or flask-shaped, 120–145 by 145–160 μ; ostiolar filaments not extruded.

I. Aecia hypophyllous, few or solitary, crowded on the under surface of yellowish spots opposite the pycnia or occasionally more or less scattered, bullate, 0.2–0.5 mm. across; peridium wanting; aeciospores somewhat irregularly ellipsoid, oblong or pyriform, 23–28 by 32–38 μ, somewhat flattened, the wall colorless, 2–3 μ thick, prominently and closely verrucose-rugose, with tendency toward an arrangement in lines and becoming united to form ridges at one end of the spore, tubercles often deciduous.

II. Uredinia hypophyllous, few, scattered, roundish, small, 0.1–0.3 mm. across, rather tardily naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores globoid or broadly obovate, 23–28 by 29–34 μ; wall cinnamon-brown, 1–1.5 μ, moderately echinulate, the pores 3, approximately equatorial.

III. Telia hypophyllous, numerous, scattered or gregarious, round, small, 0.2–0.5 mm. across, early naked, pulvinate, chestnut-brown, ruptured epidermis noticeable; teliospores cylindric-terete or fusiform, 16–22 by 56–80 μ, narrowed at both ends, obtuse at apex, not thickened, slightly constricted at septum; wall cinnamon-brown, thin, 1–1.5 μ, smooth; pedicel colorless, fragile, equaling spore in length or usually shorter.

ON CARDUACEAE:
Vernonia Schiedeana Less., Oaxaca, Veracruz; Guatemala.
TYPE LOCALITY: Jalapa, Mexico, on "*Vernonia Deppeana*," now determined as *V. Schiedeana*.
DISTRIBUTION: Southern Mexico and Guatemala.

234. Dicaeoma fraternum (H. S. Jackson) Arthur & Jackson.

Puccinia fraterna H. S. Jackson, Bot. Gaz. 65: 297. 1918.

O. Pycnia epiphyllous, few, gregarious, noticeable, blackish, globoid, 110–120 μ in diameter; ostiolar filaments not protruding.

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*Species of *Dicaeoma* on Carduaceae in collaboration with HERBERT SPENCER JACKSON.

I. Aecia hypophyllous, few, crowded in small groups opposite the pycnia, bullate, 0.2–0.5 mm. across; peridium short-cylindric, white, lacerate; peridial cells rectangular, abutted or slightly overlapping, 10–12 by 26–35 μ, the wall colorless, the outer smooth, 1.5 μ thick, the inner very closely verrucose, 4 μ thick; aeciospores globoid or broadly ellipsoid, 13–28 by 23–32 μ; wall colorless, 1–1.5 μ thick, closely and finely verrucose.

II. Uredinia hypophyllous, few, scattered, small, 0.2–0.5 mm. across, pulverulent, cinnamon-brown, ruptured epidermis not conspicuous; urediniospores broadly ellipsoid or obovate, 23–26 by 26–32 μ; wall pale cinnamon-brown, 1–1.5 μ thick, moderately echinulate, the pores 2 or 3, equatorial.

III. Telia hypophyllous, few, scattered, small, 0.2–0.5 mm. across, early naked, chestnut-brown, ruptured epidermis not conspicuous; teliospores fusiform or oblong-fusiform, 19–26 by 44–60 μ, narrowed above and below, somewhat constricted at septum; wall cinnamon-brown, uniformly 1 μ thick, smooth; pedicel colorless, fragile, about half length of spore.

ON CARDUACEAE:
Vernonia pluvialis Gleason, Jamaica.
TYPE LOCALITY: Summit of Blue Mountain Peak, Jamaica, on *Vernonia pluvialis*.
DISTRIBUTION: Known only from the type locality.

235. **Dicaeoma nothum** (Jackson & Holway) Arthur & Jackson.

Puccinia notha Jackson & Holway; H. S. Jackson, Bot. Gaz. **65**: 305. 1918.

O. Pycnia epiphyllous, few, gregarious, inconspicuous, depressed-globoid or conic, 60–90 by 50–90 μ; ostiolar filaments short.

I. Aecia hypophyllous, few, gregarious on somewhat thickened spots; peridium cylindric, whitish, membranous, rupturing irregularly; peridial cells seen only in face view, irregularly polyhedral or rectangular, 18–26 by 35–48 μ, the wall colorless, thin, 1–2 μ, closely verrucose-rugose; aeciospores somewhat irregularly ellipsoid or globoid, 20–26 by 26–35 μ; wall thin, 1–1.5 μ, closely verrucose, with the markings somewhat deciduous, the pores not evident.

II. Uredinia amphigenous, few, scattered, round, very small, 0.1–0.2 mm. across, early naked, pulverulent, whitish, ruptured epidermis not conspicuous; urediniospores globoid or obovoid, 22–26 by 26–32 μ; wall colorless, 1.5–3 μ thick, moderately echinulate, the pores obscure.

III. Telia amphigenous, chiefly epiphyllous, scattered or gregarious, small, 0.2–0.8 mm. across, early naked, becoming pulverulent, blackish-brown, ruptured epidermis not conspicuous; teliospores broadly ellipsoid, 26–34 by 35–48 μ, rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, 3.5–5 μ thick, slightly thickened by a subhyaline umbo to 7 μ at apex and over pore of lower cell which is usually placed near pedicel, or half way between pedicel and septum, prominently, evenly, and moderately verrucose, with acute points about 3–4 μ apart; pedicel colorless, persistent, firm, 5–7 μ thick, tapering and minutely verrucose at lower end, once to two and a half times length of spore, often attached laterally.

ON CARDUACEAE:
Vernonia leiocarpa DC., Guatemala.
?*Vernonia Shannoni* Coult., Guatemala.
TYPE LOCALITY: Solola, Guatemala, on *Vernonia leiocarpa*.
DISTRIBUTION: Guatemala.

236. **Dicaeoma ratum** (Jackson & Holway) Arthur & Jackson.

Puccinia rata Jackson Holway; H. S. Jackson, Bot. Gaz. **65**: 303. 1918.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, chiefly hypophyllous, scattered, round, standing out from surface of leaf, small, 0.2–0.4 mm. across, early naked, becoming pulverulent, cinnamon-brown, ruptured epidermis not conspicuous; paraphyses abundant, peripheral, standing well out from substratum, incurved, clavate, 15–18 by 100–125 μ, the wall colorless or very slightly tinted with brown, uniform, thin, 0.5–1 μ; urediniospores globoid or broadly obovate, 24–29 by 26–32 μ; wall dark cinnamon-brown, 2.5–3.5 μ thick, rather closely echinulate, the pores 4 or 5, scattered.

III. Telia hypophyllous, scattered or gregarious, round, small, 0.2–0.4 mm. across, early naked, becoming pulverulent, early-formed sori surrounded by paraphyses as in the uredinia, later-formed sori without paraphyses; teliospores broadly ellipsoid, 26–30 by 32–42 μ, rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, uniform, 3.5–5 μ thick, thickened to 5–7 μ at apex and over pore of lower cell, which is usually half way from pedicel to septum, prominently and evenly tuberculate, with closely set low tubercles, 1 μ high, having polygonal bases; pedicel short, 5–10 μ, colorless, in large part deciduous.

ON CARDUACEAE:
Vernonia leiocarpa DC., Guatemala.
TYPE LOCALITY: Guatemala City, Guatemala, on *Vernonia leiocarpa*.
DISTRIBUTION: Guatemala.

237. **Dicaeoma Baccharidis-hirtellae** (Dietel & Holway) Arthur & Jackson.

Puccinia Baccharidis-hirtellae Dietel & Holway; Holway, Bot. Gaz. **31**: 331. 1901.
Eriosporangium Baccharidis-hirtellae Arth. Résult. Sci. Congr. Bot. Vienne 343. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, abundant, scattered, round, small, 0.1–0.3 mm. across, at first bullate, early naked, pulverulent, cinnamon-brown, ruptured epidermis barely noticeable; urediniospores broadly obovoid or globoid, 18–21 by 20–26 μ; wall pale cinnamon-brown, thin, 1–1.5 μ, strongly verrucose-echinulate with points about 3 μ apart, the pores obscure, probably 3 or 4, equatorial.

III. Telia hypophyllous, abundant, scattered, round, early naked, small, 0.2–0.5 mm. across, pulvinate, chestnut-brown, or somewhat cinereous by germination, ruptured epidermis inconspicuous; teliospores ellipsoid, 24–30 by 35–42 μ, rounded at both ends, or somewhat obtuse below, slightly constricted at septum; wall minutely verrucose or punctate especially toward the upper part, light chestnut-brown, concolorous, moderately thick, 1.5–2.5 μ, thicker above, 3–7 μ; pedicel nearly or quite colorless, terete, slender, 3–5 μ thick, about length of spore.

ON CARDUACEAE:
Baccharis hirtella DC., Mexico (state).
TYPE LOCALITY: Amecameca, Mexico, on *Baccharis hirtella*.
DISTRIBUTION: Southern Mexico.

238. **Dicaeoma egressum** (Arth.) Arthur & Jackson.

Puccinia egregia Arth. Bull. Torrey Club **38**: 370. 1911. Not *P. egregia* Arth. 1905.
Eriosporangium egregium Arth. N. Am. Flora **7**: 216. 1912.
Puccinia egressa Arth. Bull. Torrey Club **46**: 108. 1919.

O. Pycnia hypophyllous, preceding the aecia, numerous, especially along the veins, punctiform, inconspicuous, honey-yellow, in section flattened-globoid, 140–175 μ broad by 100–130 μ high; ostiolar filaments about 60 μ long.

I. Aecia hypophyllous and caulicolous, abundant, scattered over the whole plant from a diffused mycelium, causing etiolation, at first more numerous along the veins and stems, bullate, mostly oval, large, 0.5–1 mm. across, the prominent peridium soon bursting through the swollen, reddish base; peridium cylindric, or flattened laterally, large, 0.3–0.5 mm. in diameter, 0.5–0.8 mm. high, fragile and somewhat evanescent; peridial cells loosely overlapping, ellipsoidal in face view, linear-rhomboidal in radial section, 30–50 μ long, 10–15 μ across, the outer wall thin, about 2 μ, smooth, the inner wall somewhat thicker, about 3 μ, strongly verrucose; aeciospores broadly ellipsoid or globoid, 16–21 by 19–26 μ; wall colorless, thin, 1.5 μ, strongly verrucose with closely set beads.

II. Uredinia not seen; urediniospores intermixed with the teliospores, globoid, 21–26 by 24–29 μ; wall cinnamon-brown, rather thin, about 1.5 μ, finely echinulate, the pores indistinct, apparently 2 and equatorial.

III. Telia hypophyllous, scattered, round, usually small, 0.1–0.2 mm. across, early naked, loosely pulvinate, becoming pulverulent, chestnut-brown, ruptured epidermis inconspicuous; teliospores ellipsoid or obovoid-ellipsoid, 21–27 by 35–45 μ, rounded or somewhat narrowed at base, obtuse or rounded at apex, slightly constricted at septum; wall minutely verrucose or punctate, cinnamon-brown, thin, 1.5 μ, much thickened at apex by a broad, pale umbo, 6–10 μ,

often appearing vertically striate, the pore of lower cell next to septum, usually with the wall much thickened; pedicel colorless, delicate, fragile, short.

ON CARDUACEAE:
Baccharis oaxacana Greenman, Oaxaca.
TYPE LOCALITY: Mt. Oaxaca, Mexico, on *Baccharis oaxacana*.
DISTRIBUTION: Known only from the type locality.

239. **Dicaeoma evadens** (Hark.) Arthur & Jackson.

Coleosporium Baccharidis Cooke & Hark. Grevillea 9: 7. 1880. Not *Eriosporangium Baccharidis* Bertero 1854, nor *Dicacoma Baccharidis* Arth. & Jacks. 1920.
Puccinia evadens Hark. Bull. Calif. Acad. 1: 34. 1884.
Caeoma Negerianum Dietel, Bot. Jahrb. 22: 357. 1896.
Eriosporangium evadens Arth. Résult. Sci. Congr. Bot. Vienne 343. 1906.

O. Pycnia amphigenous and caulicolous, scattered among the aecia on leaves and younger branches, inconspicuous, honey-yellow, globoid or ovoid, 150–175 μ in diameter.

I. Aecia amphigenous, or more commonly caulicolous, causing fusiform or irregular swellings of the branches, sometimes forming witches' brooms, scattered, oblong or oblong-linear, 0.5–1 mm. wide by 1–4 mm. long, early dehiscent, at first orange-colored, drying to a dirty-white, pulverulent, ruptured epidermis or cortex overarching, when the spores fall away showing pits or fissures; aeciospores irregularly oblong or oblong-fusiform, 22–26 by 35–60 μ, often narrowed and acute at both ends, but especially above; wall pale-yellow or quite colorless, moderately thick, 2–3 μ, somewhat thicker above, 3–9 μ, noticeably but finely verrucose, with thickly set and irregular warts.

II. Uredinia chiefly hypophyllous, scattered, usually few, round or oblong, 0.1–0.3 mm. long, soon naked, orange-colored, becoming pale, somewhat pulverulent, ruptured epidermis often overarching, otherwise inconspicuous; urediniospores broadly ellipsoid, obovoid-ellipsoid, or nearly globoid, 23–27 by 27–35 μ; wall thin, 1.5–2 μ, nearly colorless, finely and rather sparsely verrucose-echinulate with points about 3 μ apart, the pores small, very indistinct, apparently more than 4 and scattered.

III. Telia chiefly hypophyllous, and to some extent on the young branches, scattered, round, 0.3–1 mm. across, soon naked, pulvinate, pale cinnamon-brown, or cinereous by germination, ruptured epidermis inconspicuous; teliospores oblong or obovoid-oblong, 27–32 by 48–63 μ, rounded at both ends, or somewhat narrowed below, somewhat constricted at septum; wall pale-brownish, or almost colorless, smooth, thin, 1.5–2 μ, usually thicker at apex, 3–6 μ; pedicel colorless, or slightly tinted, terete, 6–10 μ in diameter, thin-walled, once to twice length of spore.

ON CARDUACEAE:
Baccharis consanguinea Greene, California.
Baccharis Emoryi A. Gray, Arizona.
Baccharis halimifolia L. (cult.), North Carolina; Cuba.
Baccharis pilularis DC., California.
Baccharis pteronioides DC., Michoacan.
Baccharis salicina T. & G., New Mexico.
Baccharis sarothroides A. Gray, Arizona.
Baccharis thesioides H. B. K., Arizona.
TYPE LOCALITY: San Francisco, California, on *Baccharis pilularis*.
DISTRIBUTION: Central California to New Mexico, and southeastward through Mexico and the West Indies; also in South America.
EXSICCATI: Barth. Fungi Columb. *2761, 2762;* Barth. N. Am. Ured. *1713, 1912;* Ellis & Ev. Fungi Columb. *53;* Ellis & Ev. N. Am. Fungi *1843;* Rab.-Wint. Fungi Eur. *3208;* Sydow, Ured. *1716*.

240. **Dicaeoma Baccharidis** (Dietel & Holway) Arthur & Jackson.

Puccinia Baccharidis Dietel & Holway; Dietel, Erythea 1: 250. 1893. Not *Erisporangium Baccharidis* Bertero, 1854.
Caeoma punctato-striatum Dietel & Neger, Bot. Jahrb. 22: 357. 1896.
Eriosporangium punctato-striatum Arth. N. Am. Flora 7: 213. 1912.

O. Pycnia amphigenous, numerous, crowded in small orbicular groups, comparatively large, punctiform, globoid-flask-shaped, 125–175 μ in diameter; pycniospores globoid, 2–3 μ in diameter.

I. Aecia hypophyllous and caulicolous, when on leaves in orbicular groups surrounding

the pycnia, at first bullate, irregular in form, 0.3–1 mm. in longest diameter, soon dehiscent, orange-colored, fading to pale-fuscous when dry, ruptured epidermis overarching, on stems forming long fissures, 5–15 mm., without producing hypertrophy, pulverulent, distinctly fuscous when dry, old fissures more or less closed; peridium wanting; aeciospores fusiform or globoid, mostly ovoid-ellipsoid, rounded below, usually somewhat pointed above or even acute, variable in size, 20–29 by 27–60 μ, usually 22–25 by 30–45 μ; wall slightly tinted or colorless, moderately thick, 2–2.5 μ, slightly if at all thicker above, verrucose with rather thickly set punctate beads, arranged in more or less evident longitudinal lines, especially toward apex.

II. Uredinia amphigenous, scattered, abundant, roundish, 0.1–0.7 mm. across, at first bullate, soon naked, pulverulent, cinnamon-brown, ruptured epidermis usually overarching; urediniospores broadly ellipsoid or obovoid, 20–27 by 29–45 μ; wall thin, 1.5–2.5 μ, pale cinnamon-brown, finely and closely echinulate, with points 1 μ or less apart, the pores evident, usually large, scattered, about 6.

III. Telia chiefly hypophyllous, thickly scattered, round, 0.3–0.8 mm. across, soon naked, pulvinate, pale cinnamon-brown, or cinerous by germination, ruptured epidermis inconspicuous; teliospores oblong, 24–29 by 45–70 μ, rounded or obtuse at both ends, somewhat constricted at septum; wall pale cinnamon-brown, smooth, thin, about 1.5 μ, a little thicker above, 2–6 μ; pedicel colorless, usually inflated up to 25 μ in diameter near the spore, tapering downward, once to twice length of spore, the wall thin, collapsing upon germination of the spore.

ON CARDUACEAE:
Baccharis coerulescens A. Gray, Hidalgo.
Baccharis Emoryi A. Gray, California.
Baccharis glutinosa Pers., Arizona, New Mexico, Texas; Chihuahua, Michoacan, Oaxaca; Guatemala.
Baccharis viminea DC., California.
Baccharis sp., Jalisco, Mexico (state).

TYPE LOCALITY: Pasadena, California, on *Baccharis viminea*.

DISTRIBUTION: From central California to Texas, and southward through Mexico and Central America; also in South America.

EXSICCATI: Barth. Fungi Columb. *4453, 4918, 5015;* Barth. N. Am. Ured. *332, 1222, 1333, 1334, 2015, 2016, 2117;* Ellis, N. Am. Fungi *1078;* Ellis & Ev. N. Am. Fungi *2244;* D. Griff. W. Am. Fungi *398*.

241. **Dicaeoma pistoricum** (Arth.) Arthur & Jackson.

Puccinia pistorica Arth. Bull. Torrey Club **38**: 372. 1911.
Eriosporangium pistoricum Arth. N. Am. Flora **7**: 215. 1912.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, abundant, scattered, roundish, large, 0.3–0.8 mm. across, soon dehiscent, but long covered partially by the overarching epidermis, light cinnamon-brown, somewhat pulverulent; urediniospores globoid or obovoid-globoid, 24–32 by 30–39 μ; wall pale-yellowish or almost colorless, moderately thin, about 2 μ, sparsely and strongly echinulate with points about 3 μ apart, the pores small, very indistinct, probably few and scattered.

III. Telia amphigenous, in compact irregular groups, from punctate to 1 mm. across, soon naked, chocolate-brown or blackish, usually shining, ruptured epidermis inconspicuous, or in small flecks giving a grayish appearance to the surface, no germination in situ seen; teliospores linear-oblong or oblong-lanceolate, small, 12–16 by 39–50 μ, obtuse or rounded above, narrowed below, slightly or not constricted at septum; wall smooth, chestnut-brown above, very much lighter toward base, thin, 1–1.5 μ, much thickened above, 6–12 μ; pedicel tinted, slender, 3–5 μ in diameter, terete, tapering downward, one half length of spore or less.

ON CARDUACEAE:
Baccharis glomeruliflora Pers., Florida.

TYPE LOCALITY: Mount Dora, Florida, on *Baccharis glomeruliflora*.

DISTRIBUTION: Known only from the type locality.

242. **Dicaeoma sphenicum** (Arth.) Arthur & Jackson.

Puccinia sphenica Arth. Bull. Torrey Club **38**: 371. 1911.
Eriosporangium sphenicum Arth. N. Am. Flora **7**: 215. 1912.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered, round, very small, 0.1–0.3 mm. across, at

first pustular, soon naked, light cinnamon-brown, pulverulent, ruptured epidermis noticeable; urediniospores broadly obovoid, 19–23 by 24–30 μ; wall pale-tawny or nearly colorless, moderately thin, 1.5 μ, minutely and rather closely echinulate, the pores not very distinct, 3 or 4, equatorial.

III. Telia hypophyllous, scattered, small, 0.1–0.3 mm. across, early naked, pulvinate, chestnut-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 27–32 by 35–45 μ, rounded at both ends, slightly or not constricted at septum; wall smooth, chestnut-brown, concolorous, moderately thick, 2.5–4 μ, thicker at apex, 4–9 μ; pedicel often inserted obliquely, colorless or somewhat tinted, terete, 6–10 μ thick, thin-walled, fragile, about length of spore.

ON CARDUACEAE:
Baccharis sordescens DC., Morelos.
TYPE LOCALITY: Cuernavaca, Morelos, on *Baccharis sordescens*.
DISTRIBUTION: Known only from the type locality.

243. **Dicaeoma exornatum** (Arth.) Arthur & Jackson.

Puccinia exornata Arth. Bull. Torrey Club **38**: 370. 1911.
Eriosporangium exornatum Arth. N. Am. Flora **7**: 214. 1912.

O. Pycnia amphigenous, loosely grouped, punctiform, large, honey-yellow, not especially conspicuous, globoid-flask-shaped, 120–160 μ in diameter.

I. Aecia hypophyllous, rather closely seated in orbicular groups surrounding the pycnia, groups 1–3 mm. across on larger discolored, unthickened spots, at first bullate, roundish, 0.3–0.5 mm. across, soon dehiscent, orange-colored fading to dirty-white, ruptured epidermis overarching, conspicuous; peridium wanting; aeciospores globoid, 24–27 by 26–32 μ; wall colorless, thick, 3–5 μ, coarsely verrucose with closely set oval beads arranged in longitudinal or slightly spiral series.

II. Uredinia hypophyllous, scattered or somewhat grouped, round, 0.1–0.2 mm. across, soon naked, low, pulverulent, pale cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid or obovoid-ellipsoid, 20–24 by 24–30 μ; wall thin, 1–1.5 μ, very pale-yellow, finely and sparsely echinulate, the pores indistinct, apparently 3 and approximately equatorial.

III. Telia hypophyllous, resembling uredinia but darker in color, 0.1–0.3 mm. across, soon naked, low, applanate, cinnamon-brown becoming cinereous by germination, ruptured epidermis inconspicuous; teliospores oblong, 19–24 by 37–48 μ, rounded at both ends, somewhat constricted at septum; wall golden-yellow, smooth, thin, 1 μ, slightly thicker above, 2–4 μ; pedicel colorless, delicate, terete, 5–9 μ in diameter, once to twice length of spore.

ON CARDUACEAE:
Baccharis rhexioides H.B.K., Costa Rica; Guatemala.
Baccharis thesioides H.B.K., Guatemala.
TYPE LOCALITY: Guatemala City, Guatemala, on *Baccharis thesioides*.
DISTRIBUTION: Central America.

244. **Dicaeoma oaxacanum** (Dietel & Holway) Arthur & Jackson.

Aecidium fragile Holway, Bot. Gaz. **31**: 331, hyponym. 1901.
Puccinia oaxacana Dietel & Holway; Holway, Bot. Gaz. **31**: 331. 1901.
Eriosporangium oaxacanum Arth. Résult. Sci. Congr. Bot. Vienne 343. 1906.

O. Pycnia amphigenous, few in a group, minute, inconspicuous, globoid, 80–100 μ broad.

I. Aecia amphigenous, abundant, in groups of 2–6 crowded about the pycnia, often solitary; peridium cylindric, 0.1–0.2 mm. in diameter, 0.1–0.3 mm. high, colorless, very delicate and evanescent; peridial cells loosely overlapping, 40–65 μ long, angularly oblong-fusiform in face view, linear in radial section, 6–10 μ across, the outer wall thin, about 1 μ, smooth, the inner wall somewhat thicker, about 2 μ, strongly verrucose; aeciospores ovoid-oblong or oblong-fusiform, often acute at one or both ends, 16–25 by 29–40 μ; wall colorless, uniformly thin, about 1 μ, strongly verrucose with closely set beads.

II. Uredinia hypophyllous, not abundant, scattered, round, very small, 0.1–0.3 mm. across, early naked, pulverulent, light cinnamon-brown, ruptured epidermis barely noticeable;

urediniospores broadly obovoid or globoid, 19–23 by 23–28 μ; wall pale cinnamon-brown, thin, 1 μ, minutely and closely echinulate with points about 1.5 μ apart, the pores very obscure, probably more than 2, scattered.

III. Telia hypophyllous, numerous, scattered, round, early naked, small, 0.1–0.4 mm. across, pulvinate, dark cinnamon-brown, or cinereous by germination, ruptured epidermis inconspicuous; teliospores oblong or obovoid, 18–25 by 33–48 μ, rounded or obtuse at both ends, often narrowed below, slightly or not constricted at septum; wall smooth, pale yellowish-brown, concolorous, thin, 1–1.5 μ, somewhat thickened at apex, 2–4 μ; pedicel nearly or quite colorless, terete, slender, 3–8 μ thick, about length of spore.

ON CARDUACEAE:

Conyza asperifolia (Benth.) Benth. & Hook. (*Baccharis hirtella* DC.), Oaxaca; Costa Rica; Guatemala.

TYPE LOCALITY: Oaxaca, Mexico, on *Baccharis hirtella*.

DISTRIBUTION: Southern Mexico and Central America.

245. **Dicaeoma aemulans** (Sydow) Arthur & Jackson.

Puccinia Gymnolomiae Dietel & Holway; Garrett, Fungi Utah. *15*, hyponym. 1904.
Puccinia aemulans Sydow, Ann. Myc. **4**: 31. 1906.

O. Pycnia epiphyllous, crowded on yellowish spots 1–3 mm. in diameter, noticeable, light chestnut-brown, globoid, 90–112 μ in diameter; ostiolar filaments up to 65 μ long, usually agglutinated into a column.

I. Aecia hypophyllous, crowded in groups 1–3 mm. in diameter, cupulate, small, 0.1–0.3 mm. in diameter; peridium white, the margin erect, erose; peridial cells oblong or rhomboidal, 16–23 by 27–42 μ, overlapping by a downward projection of the outer wall, the outer wall 6–10 μ thick, transversely striate, the inner wall thinner, 5–7 μ, very closely and finely verrucose; aeciospores globoid or broadly ellipsoid, 15–20 by 18–24 μ; wall colorless, rather thin, 1–1.5 μ, very closely and inconspicuously verrucose.

II. Uredinia chiefly hypophyllous, scattered, round, small, 0.2–0.4 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores flattened-globoid or obovoid, appearing round or obovate with pores in surface view, 19–23 by 20–26 μ, appearing triangular with pores in optical section, somewhat narrower, 17–21 μ; wall pale cinnamon-brown, thin, 1–1.5 μ, finely and closely echinulate, the pores rather indistinct, 2, opposite and slightly subequatorial.

III. Telia chiefly hypophyllous, scattered or occasionally gregarious in annular groups, small, 0.2–0.5 mm. in diameter, early naked, compact, pulvinate, blackish-brown, ruptured epidermis noticeable; teliospores ellipsoid, oblong, or obovoid, 22–28 by 35–55 μ, rounded above, rounded or somewhat narrowed below, slightly or not constricted at septum; wall chestnut- or dark cinnamon-brown, 2–3 μ thick, thickened at apex, 7–12 μ, smooth, the pore of upper cell at apex, of lower cell at septum; pedicel colorless, once to twice length of spore.

ON CARDUACEAE:

Heliomeris multiflora Nutt. (*Gymnolomia multiflora* Benth. & Hook.), Arizona, Colorado, New Mexico, Utah, Wyoming.

TYPE LOCALITY: [Wasatch Mountains near Salt Lake City], Utah, on *Gymnolomia multiflora*.

DISTRIBUTION: Mountains of Wyoming to Utah and New Mexico.

EXSICCATI: Barth. Fungi Columb. *4136;* Barth. N. Am. Ured. *415, 727;* Clements, Crypt. Form. Colo. *138, 545;* Garrett, Fungi Utah. *15, 16, 42;* Sydow, Ured. *1921, 1922, 1923;* Vesterg. Micr. Rar. Sel. *1561.*

246. **Dicaeoma** (?) **Gymnolomiae** (Arth.) Arthur & Jackson.

Puccinia Gymnolomiae Arth. Bot. Gaz. **40**: 200. 1905. Not *P. Gymnolomiae* Dietel & Holway, 1904.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, abundant, scattered, round, small, 0.2–0.4 mm. across, early naked, pulverulent, bright cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid in face view, 23 by 23–26 μ, obovate-globoid or triangular in side view, 19 by 23–26 μ; wall golden- or light cinnamon-brown, rather thin, 1.5–2 μ, closely and strongly echinulate, the pores 2, opposite and subequatorial.

III. Telia hypophyllous, scattered, round, small, 0.2–0.4 mm. across, early naked, at first pulvinate becoming somewhat pulverulent, chestnut-brown, ruptured epidermis incon-

spicuous; teliospores ellipsoid, 26–30 by 36–46 μ, rounded at both ends, strongly introverted and concave at the ends when dry, much constricted at septum; wall chestnut-brown, smooth, evenly thick, 3–4 μ, slightly thicker at apex with a low hyaline umbo; pedicel flexuous, colorless, 6–8 μ broad, once to twice length of spore, granulose at base.

ON CARDUACEAE:
Gymnolomia microcephala Less., Costa Rica; Guatemala.
Gymnolomia patens brachypoda Rob. & Greenm., Oaxaca.
Gymnolomia subflexuosa Benth. & Hook., Oaxaca.
Hymenostephium cordatum (H. & A.) Blake, Guatemala.
TYPE LOCALITY: Oaxaca, Mexico, on *Gymnolomia subflexuosa*.
DISTRIBUTION: Southern Mexico southward into Central America.
EXSICCATI: Barth. N. Am. Ured. *1247, 1248*.

247. **Dicaeoma Caleae** (Arth.) Arthur & Jackson.

Puccinia Caleae Arth. Bot. Gaz. **40**: 201. 1905.

O. Pycnia epiphyllous, crowded in small groups opposite the aecia, punctiform, inconspicuous, globoid, 100–130 μ broad.

I. Aecia hypophyllous in more or less circular groups; peridium cylindric, the margin lacerate; peridial cells irregularly rhomboidal, 19–27 by 32–40 μ, slightly overlapping, the inner wall verrucose-rugose; aeciospores globoid, 19–24 by 22–26 μ; wall colorless, 1–2 μ, conspicuously verrucose.

II. Uredinia amphigenous, in small groups or more commonly scattered, minute, 0.2–0.5 mm. across, somewhat tardily naked, cinnamon-brown, pulverulent, ruptured epidermis conspicuous; urediniospores globoid or obovoid, 22–28 by 26–34 μ; wall dark cinnamon-brown, moderately thick, 1.5–3 μ, sparsely and strongly echinulate, the pores 2, opposite, approximately equatorial.

III. Telia amphigenous, chiefly epiphyllous, scattered or sometimes gregarious, roundish, 0.2–1 mm. across, or occasionally elongate on the veins, tardily naked, somewhat pulverulent, blackish, ruptured epidermis conspicuous; teliospores ellipsoid or obovate-oblong, somewhat irregular, 24–32 by 40–56 μ, obtuse or rounded above, rounded or occasionally somewhat narrowed below, scarcely or not constricted at septum; wall dark chestnut-brown, thick, 2.5–4 μ, thickened at apex and over pore of lower cell at septum to 5–10 μ usually by a paler cinnamon-brown umbo; pedicel colorless, firm, once to twice length of spore, often deciduous.

ON CARDUACEAE:
?*Agiabampoa congesta* Rose, Sinaloa.
Calea axillaris urticaefolia Rob. & Greenm., Jalisco.
Calea hypoleuca Rob. & Greenm., Oaxaca.
Calea urticifolia (Mill.) DC., Costa Rica.
Calea zacatechichi Schlecht., Guatemala.
Calea zacatechichi macrophylla Rob. & Greenm., Guatemala.
Calea zacatechichi rugosa Rob. & Greenm., Morelos.
TYPE LOCALITY: Sayula, Jalisco, on *Calea axillaris urticaefolia*.
DISTRIBUTION: Mexico and Central America.
EXSICCATI: Barth. Fungi Columb. *3835, 4844;* Barth. N. Am. Ured. *24, 225, 930*.

248. **Dicaeoma Helianthi-mollis** (Schw.) Arth.

Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium Helianthi-mollis Schw. Schr. Nat. Ges. Leipzig **1**: 68. 1822.
Puccinia Heliopsidis Schw. Schr. Nat. Ges. Leipzig **1**: 72. 1822.
Puccinia Helianthi Schw. Schr. Nat. Ges. Leipzig **1**: 73. 1822.
Caeoma (*Aecidium*) *helianthatum* Schw. Trans. Am. Phil. Soc. II. **4**: 292. 1832.
Caeoma (*Aecidium*) *tracheliifoliatum* Schw. Trans. Am. Phil. Soc. II. **4**: 292. 1832.
Puccinia Helianthorum Schw. Trans. Am. Phil. Soc. II. **4**: 296. 1832.
Aecidium (*Caeoma*) *helianthatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Aecidium (*Caeoma*) *tracheliifoliatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Puccinia Viguierae Peck, Bull. Torrey Club **12**: 35. 1885.
Dicaeoma Helianthi Kuntze, Rev. Gen. **3**^{3}: 469. 1898.
Dicaeoma Heliopsidis Kuntze, Rev. Gen. **3**^{3}: 469. 1898.
Dicaeoma Viguierae Kuntze, Rev. Gen. **3**^{3}: 471. 1898.
Puccinia Helianthi-mollis H. S. Jackson, Brooklyn Bot. Gard. Mem. **1**: 250. 1918.

O. Pycnia amphigenous, crowded in small groups 1–2 mm. in diameter, noticeable, honey-yellow becoming brownish, globoid, 95–160 by 95–190 μ; ostiolar filaments 60–112 μ long, agglutinated into a column.

I. Aecia hypophyllous, crowded or loosely associated in small groups 1–3 mm. in diameter, cupulate, small, 0.1–0.3 mm. in diameter; peridium white, the margin erect or somewhat recurved, erose; peridial cells rhombic or rhomboidal, 15–25 by 26–48 μ, overlapping, the outer wall 4–8 μ thick, transversely striate, the inner wall 5–7 μ thick, closely verrucose; aeciospores ellipsoid or globoid, 16–23 by 20–28 μ; wall colorless, 1–1.5 μ thick, closely and inconspicuously verrucose.

II. Uredinia chiefly hypophyllous, scattered, round, 0.1–0.4 mm. in diameter, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis evident; urediniospores flattened-ellipsoid or globoid, appearing elliptic, obovate or round with pores in surface view, 19–26 by 23–34 μ, oblong or oblong-obovate with pores in optical section, 16–23 μ wide; wall dark cinnamon-brown, 1–2 μ thick, moderately echinulate, the pores 2, equatorial.

III. Telia chiefly hypophyllous, scattered or occasionally crowded in irregular groups 2–6 mm. across, round, 0.4–1 mm. in diameter, early naked, compact, pulvinate, chocolate-brown, ruptured epidermis inconspicuous; teliospores ellipsoid or oblong, 20–30 by 36–58 μ, obtuse or rounded above, rounded or somewhat narrowed below, slightly constricted at septum; wall chestnut- or dark cinnamon-brown, 1.5–3 μ thick, thickened and lighter-colored at apex, 7–12 μ, smooth, the pore of upper cell at apex, of lower cell at septum; pedicel colorless, two to three times length of spore.

ON CARDUACEAE:

Helianthus ambiguus (A. Gray) Britton, Ohio.
Helianthus angustifolius L., Alabama, Delaware.
Helianthus annuus L., Alabama, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming; Alberta, Quebec; Cuba.
Helianthus atrorubens L., Mississippi.
Helianthus californicus DC., California.
Helianthus debilis Nutt., California.
Helianthus decapetalus L., Connecticut, Delaware, Illinois, Indiana, Iowa, Michigan, Nebraska, New York, North Carolina, Ohio, Pennsylvania, Vermont, West Virginia.
Helianthus divaricatus L., Indiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, South Carolina.
Helianthus doronicoides Lam., Iowa, Kansas, Nebraska, New Jersey, New York, North Dakota.
Helianthus fascicularis Greene, Colorado, Manitoba.
Helianthus giganteus L., Indiana, Michigan, Minnesota, Nebraska, New York; Ontario.
Helianthus grosse-serratus Martens, Colorado, Indiana, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, South Dakota, Wisconsin.
Helianthus heterophyllus Nutt., South Carolina.
Helianthus hirsutus Raf., Arkansas, Indiana, Kansas, Mississippi, Missouri, Ohio, Oklahoma.
Helianthus Kellermani Britton, Wisconsin.
Helianthus laciniatus A. Gray, Coahuila.
Helianthus laetiflorus Pers., Iowa, Nebraska.
Helianthus lenticularis Dougl., California, Colorado, Kansas, Utah.
Helianthus Maximiliani Schrad., Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, South Dakota.
Helianthus microcephalus T. & G., Kentucky, Tennessee..
Helianthus mollis Lam., Arkansas, Illinois, Indiana, Iowa, Mississippi, North Carolina, Ohio, Oklahoma, Pennsylvania.
Helianthus nitidus Lunell, North Dakota.
Helianthus Nuttallii T. & G., Montana.
Helianthus occidentalis Riddell, Iowa.
Helianthus orgyalis DC., Kansas, Wisconsin.
Helianthus Parishii A. Gray, California.
Helianthus petiolaris Nutt., Colorado, Kansas, Montana, Nebraska, Wyoming.
Helianthus Rydbergi Britton, Nebraska.
Helianthus scaberrimus Ell. (*H. rigidus* Desf.), Arkansas, Illinois, Iowa, Kansas, Minnesota, Nebraska, South Dakota, Wyoming; Ontario.
Helianthus strumosus L., Illinois, Indiana, Iowa, Missouri, Nebraska, New York, Pennsylvania, Vermont, Virginia, Wisconsin; Ontario.
Helianthus subrhomboideus Rydb., North Dakota.
Helianthus tomentosus Michx., South Carolina.
Helianthus tracheliifolius Mill., Iowa, Kansas, Pennsylvania.
Helianthus tuberosus L., Alabama, Arkansas, Connecticut, Indiana, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Virginia, West Virginia; Ontario.
Heliopsis helianthoides (L.) Sweet (*H. laevis* Pers.), Indiana, Minnesota, North Carolina, Pennsylvania.

TYPE LOCALITY: North Carolina, on *Helianthus mollis*.
DISTRIBUTION: United States and adjacant Canada, and southward into Mexico and the West Indies; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 151;* McAlpine, Rusts Austr. *pl. 7, f. 56;* E. & P. Nat. Pfl. 1^{1}**: *f. 41A-C;* Krypt.-fl. Brand. Pilze 3: *f. B87.*
EXSICCATI: Barth. Fungi Columb. *2561, 2562, 2665, 2764, 2765, 2854, 2855, 2856, 3065, 3066, 3067, 3255, 3355, 3456, 3555, 3556, 3658, 3659, 3660, 3661, 3844, 3942, 3943, 4149, 4265, 4266, 4360, 4361, 4570, 4571, 4666, 4851, 4963, 4964, 5060, 5061, 5062;* Barth. N. Am. Ured. *38, 146, 238 239, 344, 449, 450, 451, 545, 546, 639, 743, 846, 847, 946, 947, 1051, 1052, 1053, 1054, 1154, 1155, 1156, 1249, 1250, 1348, 1349, 1448, 1548, 1549, 1550, 1654, 1759, 1760, 1761, 1847, 1848, 1849, 1850,1944, 1945, 1946, 2043, 2044, 2150, 2151, 2248, 2249, 2250;* Brenckle, Fungi Dak. *45, 153, 153a, 366, 416;* Carleton, Ured. Am. *40, 43;* Clements, Crypt. Form. Colo. *565;* Ellis & Ev. Fungi Columb. *185, 1392, 1573, 1574, 1647, 1761, 1853, 1854, 1960, 1961, 1962, 2056, 2057, 2058;* Ellis, N. Am. Fungi *265;* Garrett, Fungi Utah. *107, 161;* D. Griff. W. Am. Fungi *1, 72, a–c;* Kellerm. Ohio Fungi *10, 11, 30, 107, 129, 153;* Seym. & Earle, Econ. Fungi *315, 317, 481, 482a, b;* Sydow, Ured. *269, 270, 1072, 1175, 1247, 2028, 2416, 2521;* Thüm. Myc. Univ. *436.*

249. **Dicaeoma massale** (Arth.) Arthur & Jackson.

Puccinia massalis Arth. Bull. Torrey Club **46**: 119. 1919.

O. Pycnia amphigenous and caulicolous, crowded in irregular groups 2–6 mm. across, rather inconspicuous, honey-yellow, globoid or flattened-globoid, 112–120 μ broad by 96–112 μ high; ostiolar filaments 40–65 μ long, often agglutinated into a short column.

I. Aecia amphigenous and caulicolous, crowded in irregular groups 2–10 mm. across on the blades, often in irregular confluent groups 6–20 mm. long on the stems, petioles, and veins causing distortion of the host, cylindric, 0.5–0.8 mm. in diameter, 0.5–1 mm. high; peridium white or pale-yellow, the margin erect, erose or somewhat lacerate; peridial cells rhombic, 19–27 by 32–45 μ, overlapping by a downward projection of outer wall, the outer wall 7–10 μ thick, smooth, transversely striate, the inner wall 5–10 μ, closely tuberculate; aeciospores ellipsoid, 16–18 by 22–27 μ; wall colorless, 1.5–2 μ thick, very closely and inconspicuously verrucose.

II. Uredinia amphigenous, scattered, round, 0.8–1.2 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores irregularly ellipsoid, obovoid, or oblong, 18–24 by 27–35 μ; wall light cinnamon-brown, 1–1.5 μ thick, moderately echinulate, the pores 2, equatorial.

III. Telia amphigenous and caulicolous, scattered or somewhat grouped, round or oblong, 0.8–10 mm. long, early naked, pulvinate, chocolate-brown, ruptured epidermis inconspicuous; teliospores ellipsoid, 23–32 by 39–48 μ, rounded above and below, slightly or not constricted at septum; wall dark chestnut-brown, thick, 3–5 μ, thickened and lighter-colored over pores, 9–10 μ, smooth, the pore of upper cell apical, of lower cell usually half way to hilum or occasionally at septum; pedicel colorless, up to 150 μ long.

ON CARDUACEAE:
Helianthus ciliaris DC., New Mexico, Texas.
TYPE LOCALITY: Brazito, New Mexico, on *Helianthus ciliaris*.
DISTRIBUTION: New Mexico and Texas.

250. **Dicaeoma Helianthellae** (Peck) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Trichobasis Helianthellae Peck, Bot. Gaz. **7**: 45. 1882.
Aecidium Helianthellae Arth. Bull. N. Y. Bot. Gard. **2**: 348. 1902.
Puccinia Helianthellae Arth. Bull. Torrey Club **31**: 4. 1904.

O. Pycnia epiphyllous, crowded in small groups opposite the aecia, punctiform, brownish-yellow, immersed, globoid or depressed-globoid, 80–130 μ broad by 60–80 μ high; ostiolar filaments 45–60 μ long.

I. Aecia hypophyllous, on discolored spots, crowded in circular groups 2–7 mm. across; peridium erect, cylindric, at first erose, becoming coarsely lacerate; peridial cells rhomboidal, 14–18 by 28–36 μ, overlapping, the outer wall striate, 7–9 μ thick, the inner wall verrucose, 3.5–4.5 μ thick; aeciospores globoid, 16–20 by 16–22 μ; wall colorless, medium thick, 1.5–2 μ, minutely and closely granulose, usually appearing smooth.

II. Uredinia hypophyllous, becoming amphigenous, scattered or gregarious, round, 0.2–0.8 mm. across, often confluent and then much larger, to 1.5 mm., soon naked, pulverulent,

chestnut-brown, ruptured epidermis noticeable; urediniospores strongly flattened laterally, globoid or obovate, 26–32 by 30–34 μ when seen in face view, oblong, 18–22 by 30–34 μ when pores are in optical section; wall dark cinnamon-brown, thick, 2.5–3.5 μ, moderately and very finely echinulate, the pores 2, opposite, equatorial.

III. Telia amphigenous, scattered, round, 0.2–0.8 mm. across, soon naked, pulvinate becoming somewhat pulverulent, dark chestnut-brown, ruptured epidermis conspicuous; teliospores ellipsoid or obovate-oblong, somewhat irregular, 20–24 by 32–36 μ, round or obtuse at both ends, slightly or not constricted at septum; wall light chestnut-brown, moderately thick, 2–2.5 μ, thickened at apex to 5 μ by a lighter colored abrupt umbo over pore of upper cell which is often placed at one side, the pore of lower cell at septum; pedicel in large part deciduous.

ON CARDUACEAE:
Helianthella californica A. Gray (*H. nevadensis* Greene), California.
Helianthella quinquenervis (Hook.) A. Gray, Colorado, Utah.
Helianthella uniflora (Nutt.) T. & G., Utah.
Helianthella sp., Wyoming.
TYPE LOCALITY: Soda Springs, Nevada County, California, on *Helianthella californica*.
DISTRIBUTION: Eastern California to central Wyoming.
EXSICCATI: Garrett, Fungi Utah. *55, 56, 232*.

251. **Dicaeoma Zexmeniae** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia Zexmeniae Dietel & Holway; Holway, Bot. Gaz. **24**: 26. 1897.
Puccinia opaca Dietel & Holway; Holway, Bot. Gaz. **24**: 26. 1897.
Dicaeoma opacum Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

O. Pycnia amphigenous, chiefly epiphyllous, few in crowded groups among the aecia, punctiform, inconspicuous, immersed, globoid or pyriform, 65–90 by 90–150 μ; ostiolar filaments becoming agglutinate, 50–100 μ long.

I. Aecia amphigenous, chiefly epiphyllous, small, usually crowded in small groups 0.1–0.2 mm. across or scattered along the veins of the leaf; peridium cylindric, membranous, 0.5–1 mm. high, erect, becoming deeply and coarsely lacerate and finally erose; peridial cells seen in face view oblong or polygonal, 16–20 by 28–34 μ, finely verrucose-rugose, somewhat overlapping, the outer wall very thin, less than 1 μ, the inner wall 3–4 μ thick, verrucose; aeciospores globoid or oblong-globoid, 15–20 by 18–24 μ; wall nearly or quite colorless, thin, 1.5–2 μ, closely and strongly verrucose.

II. Uredinia amphigenous, scattered, small, 0.3–0.5 mm. across, round, early naked, cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores broadly ellipsoid, globoid, or obovoid, 14–20 by 18–26 μ; wall light cinnamon-brown, thin, 1.5–2.5 μ, finely and sharply echinulate, the pores 2, rarely 3, equatorial.

III. Telia amphigenous, scattered, small, 0.2–0.5 mm. across, round, early naked, becoming somewhat pulverulent, blackish-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid, often nearly globoid, 24–30 by 30–42 μ, rounded at both ends, slightly or not constricted at septum, thickened at apex, 4–8 μ; of two sorts, germinating form with walls cinnamon-brown, 1.5–2.5 μ thick, resting form with walls chestnut- or chocolate-brown, often nearly opaque, 3–5 μ thick, prominently verrucose-rugose or reticulate, appearing verrucose; pedicel colorless, largely deciduous or once to twice length of spore, sometimes inserted at one side.

ON CARDUACEAE:
Zexmenia aurea Benth. & Hook., Mexico (state).
Zexmenia ceanothifolia Schultz-Bip., Jalisco, Michoacan, Morelos.
Zexmenia costaricensis Benth., Guatemala.
Zexmenia crocea A. Gray, Morelos.
Zexmenia elegans Schultz-Bip., Michoacan.
Zexmenia fasciculata Hemsl., Michoacan, Morelos.
Zexmenia helianthoides A. Gray, Guerrero, Morelos.
Zexmenia podocephala A. Gray, Jalisco, Michoacan.
TYPE LOCALITY: Guadalajara, Jalisco, on *Zexmenia podocephala*.
DISTRIBUTION: Southern Mexico and Guatemala.
EXSICCATI: Barth. N. Am. Ured. *280, 1263;* Sydow, Ured. *1823*.

252. **Dicaeoma inauditum** (Jackson & Holway) Arthur & Jackson.

Puccinia inaudita Jackson & Holway; Arth. Am. Jour. Bot. 5: 535. 1918.

O. Pycnia amphigenous, chiefly epiphyllous, few to many, gregarious, in small groups 0.5–1.5 mm. across, often on somewhat raised spots, conspicuous, deep-seated, dark-brown, globoid or flask-shaped, 120–160 by 140–190 μ; ostiolar filaments up to 112 μ long.

I. Aecia amphigenous, few, gregarious or crowded in groups 1.5–3 mm. across, among or opposite the pycnia or more numerous along the veins beneath, cylindric, 0.5–2.5 mm. long, 0.2–0.3 mm. across; peridium whitish, membranous, splitting irregularly at apex and with one or two longitudinal slits, later becoming deeply lacerate and breaking away; peridial cells seen in face view angularly ellipsoid or polyhedral, 20–30 by 45–55 μ, the wall colorless, 1–1.5 μ thick, very finely and closely verrucose-rugose; aeciospores somewhat angularly ellipsoid or globoid, 16–24 by 24–32 μ; wall pale cinnamon-brown, 1.5–2.5 μ, coarsely tuberculate or tuberculate-rugose with colorless markings giving the appearance of reticulations.

II. Uredinia hypophyllous, few, scattered, round or oval, 0.2–0.4 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 19–21 by 24–29 μ; wall golden-brown, rather thick, 2 μ, moderately echinulate, the pores 3 o 4, scattered.

III. Telia hypophyllous, few, scattered, round, 0.2–0.8 mm. across, early naked, pulvinate, golden-brown becoming whitish on germination, ruptured epidermis not conspicuous; teliospores oblong or fusiform, 16–19 by 42–64 μ, rounded or obtuse at apex, rounded or usually somewhat narrowed at base, conspicuously constricted at septum; wall colorless, uniformly thin, 1–1.5 μ, smooth, the pore of lower cell at septum; pedicel colorless, equaling the spore or in large part deciduous.

ON CARDUACEAE:
Zexmenia leucactis Blake, Guatemala.
Zexmenia longipes Benth., Guatemala.
TYPE LOCALITY: San Felipe, Guatemala, on *Zexmenia leucactis*.
DISTRIBUTION: Guatemala.

253. **Dicaeoma Oyedaeae** (Mayor) Arthur & Jackson.

Puccinia Oyedaeae Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 535. 1913.

O. Pycnia epiphyllous, one or few associated with the aecia on slightly swollen areas of the leaf, conspicuous, chocolate-brown, globoid, 96–122 by 112–128 μ; ostiolar filaments up to 74 μ long.

I. Aecia epiphyllous, 1–12 associated with the pycnia in groups 0.3–2 mm. across, cupulate, 0.1–0.2 mm. in diameter, 0.1 mm. high; peridium white, erose; peridial cells linear-oblong in longitudinal section, 5–7 by 26–35 μ, abutted, the walls 1.5–2 μ thick, the outer smooth, the inner closely and finely verrucose; aeciospores broadly ellipsoid, 23–26 by 26–32 μ; wall yellowish, 3 μ thick, thickening up to 4–7 μ at apex, closely and coarsely tuberculate-verrucose.

II. Uredinia hypophyllous, scattered, round, 0.1–0.4 mm. in diameter, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid or broadly ellipsoid, 23–27 by 26–32 μ; wall dark cinnamon-brown, thick, 2.5–3 μ, closely and conically echinulate, the pores 6–10, scattered.

III. Telia hypophyllous, scattered, round, 0.1–0.5 mm. in diameter, early naked, slightly pulverulent, dark golden-brown becoming somewhat cinereous from germination, ruptured epidermis inconspicuous; teliospores linear-oblong or elongate-clavate, 16–23 by 61–121 μ, rounded above, rounded or narrowed below, slightly constricted at septum; wall light golden-brown at apex, paler to colorless below, 1 μ or less thick, thickened at apex, 10–15 μ, smooth; pedicel colorless, 42–74 μ long; mesospores few, resembling the teliospores, 18–24 by 32–58 μ.

ON CARDUACEAE:
Oyedaea acuminata (Benth.) Benth. & Hook. f., Costa Rica.
TYPE LOCALITY: Central Andes, Dept. Antioquia, Colombia, on *Oyedaea* sp.
DISTRIBUTION: Costa Rica; also in South America.

254. **Dicaeoma Verbesinae** (Schw.) Kuntze, Rev. Gen. **3**[3]: 471. 1898.

Aecidium Verbesinae Schw. Schr. Nat. Ges. Leipzig 1: 68. 1822.
Puccinia Verbesinae Schw. Schr. Nat. Ges. Leipzig 1: 73. 1822.
Puccinia Actinomeridis Magnus, Ber. Deuts. Bot. Ges. **19**: 294. 1901.

O. Pycnia epiphyllous, numerous, in small groups, noticeable, becoming brownish, globoid, 90–120 μ broad.

I. Aecia hypophyllous, on reddish spots, solitary or somewhat gregarious; peridium cylindric, the margin erect, erose or coarsely lacerate; peridial cells rhomboidal or irregularly ellipsoid, 23–27 by 29–34 μ, the wall 3–5 μ, coarsely verrucose; aeciospores globoid or oblong-globoid, 15–20 by 19–28 μ; wall pale-yellowish, thin, 1–1.5 μ, closely and strongly verrucose.

II. Uredinia hypophyllous or becoming somewhat amphigenous, scattered, small, 0.2–0.5 mm. across, roundish, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis inconspicuous; urediniospores globoid, ellipsoid, or obovoid, 19–23 by 20–26 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately echinulate, the pores 2, equatorial.

III. Telia hypophyllous, becoming somewhat amphigenous, scattered, small, 0.2–0.6 mm. across, round, early naked, slightly pulverulent, blackish-brown, ruptured epidermis inconspicuous; teliospores broadly ellipsoid or obovate-ellipsoid, 23–29 by 30–42 μ, rounded at both ends, slightly or not constricted at septum; wall dark chestnut-brown, moderately thick, 2–4 μ, somewhat thicker at apex, 5–7 μ, with a slightly lighter umbo, smooth; pedicel slightly tinted, fragile, length of spore.

ON CARDUACEAE:
Verbesina occidentalis (L.) Walt., Alabama, Georgia, Maryland, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.
TYPE LOCALITY: North Carolina, on *Verbesina* [*occidentalis*?].
DISTRIBUTION: West Virginia and Maryland to Alabama.
EXSICCATI: Barth. Fungi Columb. *2969;* Barth. N. Am. Ured. *2078;* Ellis & Ev. Fungi Columb. *1669;* Seym. & Earle, Econ. Fungi *518*.

255. **Dicaeoma irregulare** (Dietel) Arthur & Jackson.

?*Uredo affinis* Speg. Anal. Soc. Ci. Argent. **10**: 10. 1880. Not *Puccinia affinis* Sydow, 1902.
Puccinia irregularis Dietel, Hedwigia **36**: 33. F 1897. (Not *P. irregularis* Ellis & Tracy, Je 1897.)

O and I. Pycnia and aecia not seen.

II. Uredinia not seen; urediniospores intermixed with the teliospores, obovoid or ellipsoid, 23–26 by 24–32 μ; wall cinnamon-brown, 1.5–2.5 μ thick, moderately and minutely echinulate, the pores 2, equatorial.

III. Telia hypophyllous, scattered or somewhat gregarious, roundish, 0.2–0.6 mm. across, long covered by the epidermis, pulvinate, appearing cinereous when covered, blackish-brown when exposed; teliospores irregular, clavate, or ellipsoid, 23–29 by 32–50 μ, rounded, obtuse or truncate above, rounded or narrowed below, usually noticeably constricted; wall chestnut-brown, often lighter below, variable in thickness, 1.5–4 μ, slightly thickened above, 5–7 μ, smooth; pedicel up to once and a half times length of spore, usually collapsed or broken away, tinted cinnamon-brown.

ON CARDUACEAE:
Verbesina pallens Benth., Nicaragua.
TYPE LOCALITY: Serra Geral [Estado de Santa Catharina], Brazil, on *Verbesina subcordata*.
DISTRIBUTION: Nicaragua; also in South America.

256. **Dicaeoma cognatum** (Sydow) Arthur & Jackson.

Puccinia similis Long, Bull. Torrey Club **29**: 113. F 1902. Not *P. similis* Ellis & Ev. 1898.
Puccinia cognata Sydow, Monog. Ured. **1**: 172. Je 1902.

O. Pycnia epiphyllous, few, in small groups, inconspicuous, orange-yellow fading to brownish, globoid or flattened-globoid, 80–100 μ in height by 125–160 μ in breadth.

I. Aecia hypophyllous on discolored spots, solitary or somewhat gregarious; peridium short, cylindric, the margin erose or coarsely lacerate; peridial cells irregularly rhomboid or ellipsoid, 18–26 by .32–44 μ, not noticeably overlapping, the wall colorless, 1.5–4 μ thick, strongly verrucose; aeciospores globoid or ellipsoid, 16–22 by 22–26 μ; wall colorless or pale-yellowish, 1–2 μ thick, closely and strongly verrucose.

II. Uredinia hypophyllous or occasionally amphigenous, scattered, small, 0.2–0.7 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis usually not conspicuous; urediniospores globoid, obovoid, or ellipsoid, 19–28 by 24–30 μ; wall cinnamon- or light chestnut-brown, 1.5–2.5 μ thick, moderately echinulate, the pores 2, opposite and equatorial, occasionally placed obliquely.

III. Telia usually hypophyllous, becoming somewhat amphigenous, numerous, scattered, roundish, small, 0.2–0.7 mm. across, early naked, pulvinate, blackish-brown, ruptured epidermis usually not conspicuous; teliospores clavate, oblong or ellipsoid, 22–30 by 32–50 μ, obtuse or rounded at apex, narrowed or rounded below, slightly or not constricted at septum; wall dark cinnamon- or chestnut-brown, often somewhat lighter below, 2–3.5 μ thick, smooth, the apex thickened, 5–12 μ, with a lighter-colored umbo; pedicel colorless or slightly tinted near spore, fragile, short or equaling spore in length.

ON CARDUACEAE:
Verbesina diversifolia DC., Oaxaca.
Verbesina Fraseri Hemsl., Guatemala.
Verbesina Holwayi B. L. Robinson, Guatemala.
Verbesina pinnatifida Cav., Morelos.
?*Verbesina sphaerocephala* A. Gray, Jalisco.
Verbesina sublobata Benth., Guatemala.
Verbesina tetraptera A. Gray, Mexico (state), Michoacan, Oaxaca.
Verbesina texana Buckl., Texas.
Verbesina turbacensis H.B.K., Costa Rica.
Verbesina virginica L., Arkansas, Louisiana, Texas.
Ximenesia encelioides Cav., Texas.
TYPE LOCALITY: Austin, Texas, on *Verbesina virginica*.
DISTRIBUTION: Arkansas to Texas and Central America.
EXSICCATI: Barth. Fungi Columb. *2660, 4567;* Barth. N. Am. Ured. *323, 834;* Kellerm. Fungi Sel. Guat. *4*.

257. **Dicaeoma invelatum** (H. S. Jackson) Arthur & Jackson.

Puccinia invelata H. S. Jackson; Arth. Bull. Torrey Club **46**: 119. 1919.

O. Pycnia epiphyllous on slightly raised spots, few, gregarious, inconspicuous, orange, flattened or globoid, 115 by 112 μ; ostiolar filaments 25–40 μ long.

I. Aecia hypophyllous, scattered, solitary or in groups of two or three, hemispheric, long covered by the epidermis; peridium white, the margin lacerate; peridial cells ellipsoid, 14–18 by 27–35 μ, overlapping, the wall colorless, 3 μ thick, the outer wall smooth, the inner wall finely and irregularly but rather prominently verrucose; aeciospores ellipsoid, 16–23 by 24–26 μ; wall 1–1.5 μ thick, closely verrucose, with fine low warts.

II. Uredinia hypophyllous, numerous, scattered, roundish, small, 0.2–0.4 mm. across, early naked, somewhat pulverulent, pulvinate, cinnamon-brown, ruptured epidermis not conspicuous; urediniospores globoid, ellipsoid, or obovoid, 20–26 by 24–29 μ; wall cinnamon- or light chestnut-brown, 1.5–2 μ thick, prominently and moderately echinulate, the pores 2, opposite and equatorial with indistinct smooth area surrounding the pores.

III. Telia hypophyllous, becoming somewhat amphigenous, numerous, scattered, sometimes confluent, roundish, small, 0.1–0.4 mm. across, early naked, compact, becoming somewhat pulverulent, chestnut-brown, ruptured epidermis inconspicuous; teliospores ellipsoid or obovoid, often somewhat irregular, 19–26 by 32–45 μ, obtuse or rounded above, more or less narrowed below, slightly constricted at septum; wall cinnamon- or light chestnut-brown, laminate, thin, 1.5–2.5 μ thick, thickened above, 7–10 μ, with distinct and somewhat paler umbo; pedicel colorless, once to once and a half length of spore, usually deciduous.

ON CARDUACEAE:
Verbesina montanoifolia Rob. & Greenm., Michoacan.
TYPE LOCALITY: Patzcuaro, Michoacan, on *Verbesina montanoifolia*.
DISTRIBUTION: Michoacan.
EXSICCATI: Barth. N. Am. Ured. *426;* Barth. Fungi Columb. *5055*.

258. **Dicaeoma abruptum** (Dietel & Holway) Arthur & Jackson.

Puccinia abrupta Dietel & Holway; Dietel, Hedwigia **37**: 208. 1898.
Puccinia subglobosa Dietel & Holway; Holway, Bot. Gaz. **31**: 332. 1901.
Puccinia Ximenesiae Long, Bull. Torrey Club **29**: 114. 1902.
Puccinia affinis Sydow, Monog. Ured. **1**: 174. 1902.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, chiefly epiphyllous or caulicolous, scattered or occasionally confluent, roundish or elongate when caulicolous, 0.5–1.5 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; urediniospores variable, broadly ellipsoid, obovoid, or cuneate, 19–26 by 22–32 μ; wall light or dark cinnamon-brown, variable in thickness, 1.5–3 μ, moderately and strongly echinulate, markings often deciduous, the pores 2, equatorial or on some hosts subequatorial, occasionally 3, with one at apex, often with a smooth area around pores.

III. Telia chiefly epiphyllous, becoming amphigenous and caulicolous, scattered or occasionally confluent, round, small, 0.5–1.5 mm. across on leaves, elongate to 1 cm. and causing fusiform hypertrophy when caulicolous, early naked, becoming pulverulent, blackish, ruptured epidermis noticeable; teliospores subgloboid, broadly ellipsoid, or oblong, 24–32 by 36–48 μ, rounded above and below, slightly or not at all constricted at septum; wall dark chestnut-brown, 3–5 μ thick, thickened at apex to 10 μ by a broad lighter colored umbo, often thickened in a similar manner over pore of lower cell, smooth; pedicel colorless, 5–7 μ in diameter near spore, tapering below, usually persistent, once to thrice length of spore.

ON CARDUACEAE:
Verbesina dissita A. Gray, Lower California.
Verbesina longipes Hemsl., San Luis Potosí.
Verbesina montanoifolia Rob. & Greenm., Michoacan.
Verbesina perymenioides Schultz-Bip., Oaxaca; Guatemala.
Verbesina Rothrockii Rob. & Greenm., Coahuila.
Verbesina trilobata Rob. & Greenm., Oaxaca.
Verbesina virgata Cav., Mexico (state).
Verbesina sp., California.
Viguiera buddleiaeformis Benth. & Hook., Mexico (state), Michoacan.
Viguiera excelsa Benth. & Hook., Mexico (state).
Viguiera helianthoides H.B.K., Texas; Aguascalientes, Hidalgo, Pueblo; Cuba.
Viguiera sylvatica Klatt, Costa Rica.
Viguiera tenuis A. Gray, Jalisco.
Ximenesia encelioides Cav., Texas.

TYPE LOCALITY: Mexico, on *Viguiera helianthoides*.

DISTRIBUTION: Southern part of Texas and of California to Guatemala, and in Cuba.

EXSICCATI: Barth. Fungi Columb. *3452, 3831, 4560, 4949;* Barth. N. Am. Ured. *15, 118, 119, 524, 1215, 1323, 1326, 1516;* Ellis & Ev. Fungi Columb. *1638;* Sydow, Ured. *1514, 1705, 2057, 2540.*

259. **Dicaeoma senecionicola** (Arth.) Arthur & Jackson.

Puccinia senecionicola Arth. Bot. Gaz. **40**: 199. 1905.

O. Pycnia epiphyllous, crowded in spots 1–5 mm. in diameter, noticeable, chestnut-brown, globoid or flattened-globoid, 112–175 μ wide by 96–128 μ high; ostiolar filaments up to 75 μ long, usually agglutinated into a column.

I. Aecia hypophyllous, rather loosely grouped upon spots 2–5 mm. in diameter, flattened-hemispheric, large, 0.5–1 mm. in diameter; peridium white, the margin incurved, fragile, covered more or less by the overarching epidermis; peridial cells oblong, 19–23 by 39–55 μ, abutted, the walls 3–5 μ thick, the outer smooth, the inner closely and noticeably verrucose; aeciospores irregularly globoid or ellipsoid, 22–30 by 26–36 μ; wall colorless, thick, 2–3.5 μ, closely and coarsely verrucose.

II. Uredinia amphigenous, scattered or in small groups, round, 0.2–1 mm. in diameter, somewhat tardily naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; urediniospores globoid or ellipsoid, 21–27 by 26–35 μ; wall cinnamon- or chestnut-brown, 1.5–3 μ thick, usually thinner about the pores than above, sometimes 1 μ, moderately and strongly echinulate, the pores 2, opposite and equatorial or occasionally superequatorial.

III. Telia hypophyllous, at first circinating about the uredinia, finally scattered, round, 0.1–0.8 mm. in diameter, long covered by the epidermis, bullate, compact, grayish-brown, ruptured epidermis finally conspicuous; teliospores ellipsoid or oblong-clavate, 18–30 by 37–64 μ, rounded or obtuse above, more or less narrowed below, slightly constricted at septum; wall cinnamon- or chestnut-brown, 1.5–3 μ thick, usually with a semihyaline covering at apex, 3–12 μ, smooth; pedicel light cinnamon-brown, up to length of spore.

ON CARDUACEAE:
Cacalia amplifolia DC., Oaxaca.
Cacalia ampullacea Greenman, Hidalgo.

Cacalia calotricha Blake, Guatemala.
Cacalia Pringlei S. Wats., Jalisco.
Cacalia obtusiloba Rob. & Greenm. Michoacan, Morelos.
Cacalia sinuata Cerv., Michoacan.
Senecio angulifolius DC., Hidalgo, Mexico (state), Oaxaca.
Senecio petasioides Greenman, Guatemala.
Senecio sinuatus H.B.K., Hidalgo.
Senecio Warszewiczii Braun & Bouché, Guatemala.

TYPE LOCALITY: Amecameca, Mexico, on *Senecio angulifolius*.
DISTRIBUTION: Southern Mexico southward into Guatemala.
EXSICCATI: Barth. Fungi Columb. *3861, 4974, 5070;* Barth. N. Am. Ured. *60, 169, 366, 469, 1268, 1369;* Sydow, Ured. *2385*.

260. **Dicaeoma Cnici** (H. Mart.) Arth. Résult. Sci. Congr. Bot. Vienne 344. 1906.

Puccinia Cnici H. Mart. Fl. Mosq. 226. 1817.
Puccinia Cirsii-lanceolati Schroet.; Cohn, Krypt.-Fl. Schl. **3**[1]: 317. 1887.
Dicaeoma Cirsii-lanceolati Kuntze, Rev. Gen. **3**[3]: 468. 1898.
Aecidium Kabatianum Bubák, Sitz.-ber. Böhm. Ges. Wiss. **1899**[19]: 10. 1899.
Gymnoconia Cirsii-lanceolati Bubák, Sitz.-ber. Böhm. Ges. Wiss. **1899**[19]: 10. 1899.
Puccinia Cirsii-eriophori Jacky, Zeits. Pflanzenkr. **9**: 275. 1899.
Jackya Cirsii-lanceolati Bubák, Oesterr. Bot. Zeits. **52**: 42. 1902.
Jackya Cirsii-eriophori Bubák, Oesterr. Bot. Zeits. **52**: 42. 1902.
Aecidium Cirsii-lanceolati Kellerm. Jour. Myc. **9**: 229. 1903.

O. Pycnia epiphyllous, crowded in small groups 1–2 mm. in diameter, rather inconspicuous, honey-yellow becoming light-brown, globoid, 160–350 μ in diameter; ostiolar filaments short, not projecting beyond the ostiole; pycniospores ovoid, about 3 by 4 μ.

I. Aecia mostly hypophyllous, solitary or loosely grouped in spots 3–8 mm. across, globoid, 0.5–1 mm. in diameter, long covered by the overarching epidermis, finally opening by a central pore or slit; peridium wanting or represented by a few isolated aeciospore-like cells; aeciospores globoid or ellipsoid, 20–27 by 25–35 μ; wall colorless, thick, 2–3 μ, closely and distinctly verrucose.

II. Uredinia amphigenous or caulicolous, scattered, round or oblong, 0.3–1.5 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 23–29 by 27–35 μ; wall cinnamon-brown, 1.5–3 μ thick, moderately and prominently echinulate, the pores usually 3, rarely 2 or 4, equatorial, covered by the swollen cuticle in the form of bullate swellings, 12–19 μ across and 1–3 μ thick.

III. Telia amphigenous, scattered, round, 0.3–0.8 mm. in diameter, early naked, pulverulent, chestnut-brown, ruptured epidermis rather conspicuous; teliospores ellipsoid or oblong, 20–29 by 32–45 μ, rounded or obtuse above, rounded or slightly narrowed below, slightly or not constricted at septum; wall chestnut-brown, 1.5–3 μ thick, slightly thickened into a low umbo over the pores, 3–7 μ, closely and minutely verrucose appearing smooth when wet; pedicel colorless, fragile, about as long as spore.

ON CARDUACEAE:
Cirsium lanceolatum (L.) Hill (*Cnicus lanceolatus* Willd.), Colorado, Deleware, Idaho, Indiana, Iowa, Maine, Massachusetts, Michigan, Montana, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Utah, Washington, West Virginia, Wisconsin; British Columbia, Ontario.

TYPE LOCALITY: Near Moscow, Russia, on *Cnicus lanceolatus*.
DISTRIBUTION: Northern United States and adjacent Canada; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz **2**[2]: *f. 153, 154;* Krypt.-fl. Brand. Pilze **3**: *f. B51;* Zeits. Pflanzenkr. **9**: *p. 275, f. 1, p. 277, f. 2*.
EXSICCATI: Barth. Fungi Columb. *3168, 3253, 4353, 5053;* Barth. N. Am. Ured. *423, 831, 832, 1228, 1432, 1835, 1938, 2236;* Garrett, Fungi Utah. *68;* Kellerm. Ohio Fungi *128;* Seym. & Earle, Econ. Fungi *307a, b;* Sydow, Ured. *1911*.

261. **Dicaeoma Lapsanae** (Schultz) Kuntze, Rev. Gen. **3**[3]: 469. 1898.

Aecidium Lapsanae Schultz, Prodr. Fl. Stargard. 454. 1806.
Aecidium compositarum Lapsanae Purton; Cooke, Jour. Bot. **2**: 38. 1864.
Trichobasis Lapsanae Cooke, Micr. Fungi ed. 4. 224. 1865.
Puccinia Lapsanae Fuckel, Symb. Myc. 53. 1869.

O. Pycnia amphigenous, gregarious in round or irregular groups with the aecia, noticeable, honey-yellow becoming brownish, conic-globoid, 60–110 μ in diameter by 60–80 μ high; ostiolar filaments 20–35 μ long.

I. Aecia amphigenous, numerous, gregarious in round, oblong, or irregular groups, on brownish-red or purplish spots 1–8 mm. in length, cupulate, 0.3–0.4 mm. in diameter; peridium whitish, the margin recurved, entire or lacerate; peridial cells rhomboidal, 15–20 by 35–45 μ, overlapping, the outer wall rather thin, 2–5 μ, almost smooth, the inner wall thicker, 5–9 μ, coarsely verrucose; aeciospores ellipsoid, globoid, or angular, 13–19 by 17–23 μ; wall colorless, thin, 1–1.5 μ, minutely verrucose.

II. Uredinia amphigenous, numerous, scattered, roundish or irregular, small, 0.1–0.3 by 0.1–0.5 mm., early naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or obovoid, 15–20 by 17–22 μ; wall cinnamon-brown, thin, 1–1.5 μ, moderately echinulate, the pores 2, rarely 3, approximately equatorial.

III. Telia amphigenous, numerous, scattered, roundish, oval, or irregular, rather small, 0.1–0.5 by 0.1–0.8 mm., early naked, pulverulent, chocolate-brown, ruptured epidermis at first noticeable, later lacking; teliospores ellipsoid or globoid, 17–26 by 24–33 μ, rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, uniformly and moderately thick, 1.5–2 μ, inconspicuously verrucose, the pore of the upper cell apical or subapical, the pore of the lower cell midway between the pedicel and the septum; pedicel hyaline, short or deciduous, often placed obliquely.

ON CICHORIACEAE:
Lapsana communis L., New York, Oregon; Ontario.
TYPE LOCALITY: Near Stargard, Mecklenburg-Strelitz, Germany, on *Lapsana communis*.
DISTRIBUTION: Western New York to Southern Ontario, probably introduced locally into North America; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz *f. 159;* Ber. Deuts. Bot. Ges. **11**: *pl. 21;* Jour. Bot. **2**: *pl. 14, f. 2;* Krypt.-fl. Brand. Pilze **3**: *f. B55.*
EXSICCATI: Barth. Fungi Columb. *4269;* Barth. N. Am. Ured. *1352.*

262. **Dicaeoma** (?) **Harknessii** (Vize) Kuntze, Rev. Gen. **3**[3]: 469. 1898.

Puccinia Harknessii Vize, Grevillea **7**: 11. 1878.
Puccinia cladophila Peck, Bot. Gaz. **4**: 127. 1879.
Dicaeoma cladophilum Kuntze, Rev. Gen. **3**[3]: 468. 1898.
Puccinia Ptiloriae Bubák, Jour. Myc. **12**: 52. 1906.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, caulicolous, rather numerous, scattered or more often grouped in longitudinal patches, occasionally confluent, round or elliptic, 0.2–1.5 mm. across, tardily naked, finally uncovered by longitudinal splitting of the epidermis, pulverulent, dark cinnamon-brown, ruptured epidermis very conspicuous; urediniospores broadly ellipsoid, obovoid, or globoid, 19–26 by 23–29 μ; wall cinnamon-brown, 1–1.5 μ thick, closely and finely echinulate, the pores 2, superequatorial.

III. Telia amphigenous, caulicolous, very numerous, usually scattered on leaves but occasionally closely grouped or confluent, on stems for the most part confluent in large patches, round or elliptic, 0.2–1 mm. across, rather early naked, pulvinate, becoming somewhat pulverulent, blackish-brown, ruptured epidermis noticeable; teliospores ellipsoid or oblong-ellipsoid, 19–26 by 32–45 μ, rounded above, rounded or slightly narrowed below, slightly constricted at septum; wall chestnut-brown, 2–3 μ thick, uniform, very finely and closely verrucose; pedicel hyaline, fragile, deciduous, two to three times length of spore.

ON CICHORIACEAE:
Lygodesmia texana (T. & G.) Greene (*L. aphylla* T. & G.), Texas.
Pleiacanthus spinosus (Nutt.) Rydb. (*Lygodesmia spinosa* Nutt.), California, Oregon (?), Nevada.
Ptiloria exigua (Nutt.) Greene (*Stephanomeria exigua* Nutt.), California.
Ptiloria lactucina (A. Gray) Greene, (*Stephanomeria lactucina* A. Gray), California.
Ptiloria myrioclada (D. C. Eaton) Greene (*Stephanomeria myrioclada* D. C. Eaton), Idaho.
Ptiloria neomexicana Greene, New Mexico.
Ptiloria paniculata (Nutt.) Greene (*Stephanomeria paniculata* Nutt.), Oregon, Washington.
Ptiloria pauciflora (Torr.) Raf. (*Stephanomeria runcinata* Nutt.), Arizona, Montana.
Ptiloria ramosa Rydb., Colorado, Montana.
Ptiloria tenuifolia (Torr.) Raf. (*Stephanomeria minor* Nutt.), Colorado, Montana, Nevada, Utah, Washington.
TYPE LOCALITY: Sierra Nevada, California, on *Lygodesmia* sp.

DISTRIBUTION: The semiarid region of the mountains from Washington and Montana to southern California and central Texas.

EXSICCATI: Barth. Fungi Columb. *4665;* Barth. N. Am. Ured. *1153, 1447, 1653, 1758, 1943;* Ellis & Ev. Fungi Columb. *1646;* Ellis & Ev. N. Am. Fungi *1839;* Ellis, N. Am. Fungi *1446;* D. Griff. W. Am. Fungi *396, 396a-d;* Rab.-Wint. Fungi Eur. *3814*; Rab.-Wint.-Paz. Fungi Eur. *4019;* Sydow, Ured. *1771.*

263. **Dicaeoma** (?) **Stephanomeriae** (Sydow) Arthur.

Puccinia Stephanomeriae Sydow, Monog. Ured. 1: 157. 1902.

O and I. Pycnia and aecia unknown.

II. Uredinia mostly epiphyllous, few, scattered, round, 0.1–0.3 mm. in diameter, rather tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, obovoid, or globoid, 23–29 by 29–35 μ; wall light chestnut-brown, 1.5–2.5 μ thick, moderately and very strongly echinulate, the pores 2, approximately equatorial.

III. Telia amphigenous and caulicolous, numerous, scattered or frequently circinating, 1–2.5 mm. across, round, 0.1–1 mm. in diameter, rather early naked, pulvinate, becoming pulverulent, chestnut- or blackish-brown, ruptured epidermis evident; teliospores ellipsoid or obovoid-ellipsoid, 21–29 by 35–45 μ, rounded above, rounded or slightly narrowed below, slightly or not constricted at septum; wall chestnut-brown, 2–3 μ thick, uniform, finely verrucose; pedicel colorless, up to 85 μ long, deciduous.

ON CICHORIACEAE:
Ptiloria cichoriacea (A. Gray) Greene (*Stephanomeria cichoriacea* A. Gray), California.
Ptiloria pleurocarpa Greene, California.
TYPE LOCALITY: San Gabriel Mountains, California, on *Stephanomeria cichoriacea.*
DISTRIBUTION: Known only from the type locality and vicinity.
EXSICCATI: Barth. N. Am. Ured. *264.*

264. **Dicaeoma variabile** (Grev.) Kuntze, Rev. Gen. 3[3]: 471. 1898.

Puccinia variabilis Grev. Scot. Crypt. Fl. *pl. 75.* 1823.
Aecidium Taraxaci Grev. Fl. Edinb. 444. 1824. Not *A. Taraxaci* Kunze & Schmidt, 1816.
Aecidium Grevillei Grove, Jour. Bot. 23: 129. 1885.

O. Pycnia not seen.

I. Aecia hypophyllous or sometimes amphigenous, scattered over large areas or solitary, loosely gregarious or rarely gregarious on discolored spots, often associated with or opposite uredinia or telia, cupulate, rather small, 0.2–0.3 mm. in diameter; peridium white, the margin recurved, lacerate; peridial cells narrowly rhomboidal, 10–20 by 25–45 μ, loosely overlapping, the outer wall thin, 2–4 μ, smooth, the inner wall thicker, 4–8 μ, verrucose; aeciospores globoid, ellipsoid or polygonal, 13–20 by 16–25 μ; wall colorless, thin, 1 μ, minutely verrucose.

II. Uredinia amphigenous, scattered, roundish, small, 0.1–0.3 mm. in diameter, loosely but rather long covered by the membranous epidermis, pulverulent, ruptured epidermis evident; urediniospores ellipsoid, globoid, or ovoid, 16–24 by 20–28 μ; wall cinnamon-brown, moderately thick, 1.5–2 μ, closely echinulate, the pores 2 or 3, approximately equatorial.

III. Telia amphigenous, scattered, or confluent on yellowish or purplish spots, often with the uredinia, roundish, oval, or irregular, rather small, 0.1–0.3 by 0.1–0.6 mm., early naked, pulverulent, blackish- or chestnut-brown, ruptured epidermis noticeable; teliospores ellipsoid or oblong, 18–24 by 21–30 μ, usually rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, moderately thick, 1.5–2 μ, occasionally thickened at apex up to 3–4 μ, inconspicuously verrucose; pedicel hyaline, fragile, short, 3–4 μ, often placed obliquely.

ON CICHORIACEAE:
Leontodon Taraxacum L. (*Taraxacum officinale* Weber, *T. Taraxacum* Karst.), Nova Scotia.
TYPE LOCALITY: Near Edinburgh, Scotland, on *Leontodon Taraxacum.*
DISTRIBUTION: Sparingly introduced in Nova Scotia; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz 2[1]: *f. 158;* Corda, Ic. Fung. 4: *pl. 5, f. 64;* Krypt.-fl. Brand. Pilze 3: *f. B57.*

265. **Dicaeoma Orbicula** (Peck & Clinton) Kuntze, Rev. Gen. 3[3]: 469. 1898.

Puccinia Orbicula Peck & Clinton; Peck, Rep. N. Y. State Mus. 30: 53. 1879.
Puccinia Prenanthis-racemosae Sydow, Monog. Ured. 1: 137. 1902.

O. Pycnia amphigenous, often gregarious among or opposite the aecia, inconspicuous, immersed, honey-yellow becoming brownish, globoid, 128–160 μ wide by 112–144 μ deep; ostiolar filaments short or wanting.

I. Aecia hypophyllous or petiolicolous, gregarious in small groups, often with uredinia and telia, globoid, 0.3–0.5 mm. in diameter; peridium absent, but the epidermis arched over and opening at the center; aeciospores globoid, ellipsoid, or angular, 16–24 by 21–33 μ; wall pale-yellow or colorless, rather thin, 1–2 μ, finely and inconspicuously verrucose.

II. Uredinia hypophyllous, sometimes amphigenous and petiolicolous, scattered or gregarious in groups with aecia or telia, sometimes in circular groups, roundish or oval, 0.2–1 by 0.2–1.5 mm., rather early naked, pulverulent, yellowish or golden-brown, ruptured epidermis evident; urediniospores globoid or ellipsoid, 20–27 by 23–31 μ; wall yellowish or very light chestnut-brown, rather thick, 1.5–3 μ, moderately echinulate, the pores not constant, 2–5, usually scattered, sometimes equatorial.

III. Telia amphigenous or petiolicolous, many, scattered or in groups, roundish, oval, or irregular, 0.2–0.8 by 0.3–2 mm., early naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; teliospores ellipsoid, 20–30 by 30–43 μ, rounded at both ends, rarely constricted at septum; wall chestnut-brown, uniformly thick, 1.5–2.5 μ, moderately and finely verrucose; pedicel colorless, deciduous.

ON CICHORIACEAE:
Nabalus albus (L.) Hook. (*Prenanthes alba* L.), Indiana, Maine, Massachusetts, Michigan, New York.
Nabalus altissimus (L.) Hook. (*Prenanthes altissima* L.), Massachusetts, New York, Ohio, Pennsylvania, Vermont, West Virginia; Nova Scotia.
Nabalus Boottii DC. (*Prenanthes Boottii* A. Gray), New Hampshire.
Nabalus racemosus (Michx.) DC. (*Prenanthes racemosa* Michx.), Saskatchewan.
Nabalus trifoliolatus Cass. (*Prenanthes trifoliolata* Fernald), Massachusetts, New York; Quebec.
Nabalus sp., Delaware; Newfoundland; Ontario.
TYPE LOCALITY: Buffalo, New York, on *Nabalus* sp.
DISTRIBUTION: Newfoundland to Saskatchewan, and southward to Indiana and West Virginia.
ILLUSTRATION: Sydow, Monog. Ured. 1: 127, *f. 106*.
EXSICCATI: Ellis, N. Am. Fungi *263;* Ellis & Ev. Fungi Columb. *1381a.*

266. **Dicaeoma insperatum** (H. S. Jackson) Arthur.

Puccinia insperata H. S. Jackson, Brooklyn Bot. Gard. Mem. **1**: 253. 1918.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous and petiolicolous, in crowded groups on yellowish spots 2–3 mm. across, cupulate, 0.2–0.3 mm. broad; peridium whitish, the margin recurved, lacerate; peridial cells rhombic, 19–27 by 35–45 μ, overlapping, the outer wall 1–1.5 μ thick, the inner wall 3–4 μ thick, verrucose; aeciospores globoid or broadly ellipsoid, 15–19 by 19–23 μ; wall colorless, 1–1.5 μ thick, finely and closely verrucose.

II. Uredinia amphigenous, scattered, round, 0.2–0.5 mm. across, tardily naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, occasionally obovoid, 19–21 by 23–29 μ; wall cinnamon-brown, 1.5–2 μ thick, minutely and closely echinulate, the pores 2 or 3, equatorial or somewhat scattered.

III. Telia amphigenous and petiolicolous, scattered, round, 0.2–0.8 mm. across, tardily naked, bullate, pulverulent, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or broadly obovoid, occasionally somewhat irregular, 16–20 by 23–32 μ, rounded at both ends, scarcely or not at all constricted at septum; wall chestnut-brown, 1.5–2 μ thick, occasionally thickened up to 3 μ above, moderately and inconspicuously verrucose, appearing smooth when wet; pedicel colorless, deciduous.

ON CICHORIACEAE:
Nabalus hastatus (Less.) A. Heller, Alaska, Oregon.
TYPE LOCALITY: Road to Lost Lake, Hood River Valley, Oregon, on *Nabalus hastatus*.
DISTRIBUTION: Oregon and southeastern Alaska.

267. **Dicaeoma hemisphaericum** (Peck) Arth.

Résult. Sci. Congr. Bot. Vienne 344. 1906.

Aecidium hemisphaericum Peck, Bot. Gaz. **3**: 34. 1878.
Puccinia minussensis Thüm. Bull. Soc. Nat. Mosc. **53**: 214. 1878.

Puccinia hemisphaerica Ellis & Ev. N. Am. Fungi *3144*. 1894.
Dicaeoma minussense Kuntze, Rev. Gen. 3³: 469. 1898.

O. Pycnia amphigenous, numerous, rather gregarious, sometimes covering the greater part of the leaf, noticeable, honey-yellow becoming brownish, conic or flattened-globoid, 100–130 by 65–130 μ; ostiolar filaments 20–45 μ long; pycniospores numerous.

I. Aecia amphigenous or caulicolous, very numerous, often clustered along the midrib, globoid, hemispheric in surface view, often oval, rather large, 0.3–0.8 mm. in diameter; peridium absent, but the epidermis arched over and opening by a pore at the center, yellow; aeciospores globoid or flattened-globoid, 16–29 by 18–28 μ; wall colorless, rather thick, 2–3 μ, finely and closely verrucose.

II. Uredinia amphigenous, few, scattered, roundish or oval, small, 0.2–0.4 by 0.2–0.6 mm., early naked, pulverulent, golden-brown, ruptured epidermis conspicuous; urediniospores ellipsoid, 17–25 by 23–27 μ; wall cinnamon-brown, rather thin, 1–2 μ, closely and finely echinulate, the pores 3–6, sometimes indefinite and uncertain, but often 4, 2 above and 2 below the equator, alternating.

III. Telia amphigenous, numerous, scattered on somewhat dark spots, roundish or oval, 0.2–0.8 by 0.2–1 mm., early naked, pulverulent, chestnut-brown, ruptured epidermis noticeable; teliospores ellipsoid, 16–24 by 26–42 μ, rounded at both ends, slightly or not constricted at septum; wall cinnamon-brown, uniformly thin, 1.5 μ, moderately or closely verrucose; pedicel colorless, fragile or deciduous; mesospores often present.

ON CICHORIACEAE:
Lactuca canadensis L., New York.
Lactuca pulchella (Pursh) DC. (*Mulgedium pulchellum* G. Don), Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Washington, Wisconsin, Wyoming; British Columbia, Manitoba.
TYPE LOCALITY: Colorado, on *Mulgedium pulchellum*.
DISTRIBUTION: Westward from the Mississippi River and Wisconsin to the Pacific coast, and on Long Island on the Atlantic Coast; also in northern Europe.
ILLUSTRATIONS: Sydow, Monog. Ured. 1: 117, *f. 93*.
EXSICCATI: Barth. Fungi Columb. *2357, 3662, 3760, 4359;* Barth. N. Am. Ured. *452, 547, 744, 1251, 1551, 1762, 2041, 2042;* Brenckle, Fungi Dak. *62, 62a;* Clements, Crypt. Form. Colo. *566;* Ellis & Ev. Fungi Columb. *752, 1381b, 1654, 2150;* Ellis & Ev. N. Am. Fungi *3144;* Garrett, Fungi Utah. *22, 136;* D. Griff. W. Am. Fungi *53, 53a, 372;* Sydow, Ured. *1924, 2317*.

268. **Dicaeoma** (?) **proximellum** Arthur.

Uredo proximella Arth. Mycologia 7: 324. 1915.
Puccinia proximella Arth. Bull. Torrey Club 47: 471. 1920.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, crowded in groups 2–4 mm. across or scattered, bullate, roundish or irregular, large, 0.3–0.9 mm. across, tardily naked, cinnamon-brown, pulverulent, ruptured epidermis conspicuous as a partial membranous covering; urediniospores broadly ellipsoid, 17–20 by 19–24 μ; wall cinnamon-brown, thin, 1–1.5 μ, closely and finely echinulate, the pores rather indistinct, 4–6, scattered, usually 4.

III. Telia hypophyllous, scattered, oval or oblong, 0.5–0.8 mm. long, rather tardily naked, chocolate-brown, somewhat pulverulent, ruptured epidermis conspicuous, partially covering the sorus; teliospores ellipsoid or oblong, sometimes irregularly so, 21–27 by 26–42 μ, rounded above and below, slightly constricted at septum; wall dark chestnut-brown, uniformly thick, 1.5–2 μ, moderately and distinctly verrucose, the pore of upper cell usually apical, of lower cell in the lower half, sometimes above; pedicel colorless, sometimes laterally displaced.

ON CICHORIACEAE:
Lactuca intybacea Jacq., Cuba; Porto Rico; St. Domingo.
TYPE LOCALITY: Sabana Grande, Porto Rico, on *Lactuca intybacea*.
DISTRIBUTION: West Indies.

269. **Dicaeoma Crepidis-montanae** (Sydow) Arthur.

Aecidium Crepidis-montanae Sydow, Oesterr. Bot. Zeits. 51: 29. 1901.
Puccinia Crepidis-montanae Magnus; Ed. Fisch. Beitr. Krypt. Schweiz 2²: 212. 1904.

O. Pycnia amphigenous, gregarious in small groups about 1 mm. across, rather inconspicuous, dark-brown, flattened-globoid or globoid, 98–160 μ wide by 96–130 μ high; ostiolar filaments short, up to about 80 μ long, not projecting much beyond the ostiole.

I. Aecia amphigenous, crowded in small groups, 2–3 mm. in diameter, cupulate, 0.2–0.3 mm. in diameter; peridium white or slightly yellowish, fragile; peridial cells oblong or comma-form in radial longitudinal section, 13–22 by 26–44 μ, considerably overlapping through a long slender downward projection, the outer wall thin, 1.5–2 μ, smooth, the inner wall thick, 4–9 μ, closely and finely verrucose; aeciospores broadly ellipsoid or oblong, 16–19 by 21–26 μ; wall slightly tinted, thin, 1 μ, very finely and closely verrucose.

II. Uredinia hypophyllous, scattered or in small groups, round or oval, 0.2–1 mm. across, more or less covered by the ruptured epidermis, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, 19–25 by 23–29 μ; wall light cinnamon-brown, moderately thick, 1.5–2 μ, moderately and finely echinulate, the pores 3–4, equatorial or approximately so.

III. Telia hypophyllous or caulicolous, scattered or circinating about the uredinia, round or oval, 0.3–1 mm. across on the leaves, linear, 0.5–7 mm. long on the stems, sometimes remaining somewhat covered by the epidermis, pulverulent, dark chocolate-brown, ruptured epidermis evident; teliospores broadly ellipsoid or oblong, 19–28 by 29–42 μ, rounded above and below, somewhat constricted at septum; wall chestnut-brown, 1.5–2.5 μ thick, slightly thickened over pores, 3–4 μ, very closely and finely verrucose, often appearing smooth, the pore of the upper cell variable, of the lower usually in the upper half of the cell, sometimes below; pedicel colorless, fragile.

ON CICHORIACEAE:
Crepis barbigera Leib., Washington.
Crepis denticulata Rydb., Colorado.
Crepis glauca (Nutt.) T. & G., Utah.
Crepis intermedia A. Gray, Idaho, Oregon.
Crepis occidentalis Nutt., Montana.
Crepis runcinata (James) T. & G., Colorado.
TYPE LOCALITY: Kaiserjoch near Pettneu, Northern Tyrol, on *Crepis montana*.
DISTRIBUTION: Rocky mountains from Colorado northward into Canada; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 165;* Zeits. Pflanzenkr. 9: 278, *f. 3a, b, d.*
EXSICCATI: Barth. Fungi Columb. *4459;* Clements, Crypt. Form. Colo. *135.*

DOUBTFUL SPECIES

DICAEOMA CAMPULOSI (Thüm.) Kuntze, Rev. Gen. 3^3: 468. 1898. (*Puccinia Campulosi* Thüm. Bull. Torrey Club 6: 215. 1878.) On *Campulosus monostachyae* Beauv. "America septentr.; sine loco. Ex. herb. Dr. C. Keck." This species has not been reported by any other person and the material from which the description was drawn has been destroyed by fire. A search in the phanerogamic collections at the New York Botanical Garden, Academy of Sciences at Philadelphia, National Herbarium at Washington, and Field Museum at Chicago, on the host named, has failed to reveal any rust. The description given by von Thümen is too meager to fully establish the species as wholly distinct.

32. **PUCCINIOLA** Marchand, Bijdr. Nat. Wet. 4: 47. 1829.

Uromyces § *Uromycopsis* Schroet. Abh. Schles. Ges. 48: 11. 1869.
Uromycopsis Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Cycle of development includes pycnia, aecia, and telia; autoecious. Pycnia and other sori subepidermal.

Pycnia immersed in the host tissues, usually globoid or flask-shaped, with protruding ostiolar filaments.

Aecia erumpent, cupulate or cylindric. Peridium usually firm, dehiscent at apex and the margins more or less reflexed. Aeciospores catenulate, globoid or ellipsoid; walls nearly or quite colorless, verrucose.

Telia frequently first arise closely about the aecia, or even within the aecial cups, replacing the aeciospores, afterward independently. Teliospores one-celled; wall colored, or in some species colorless, smooth or sculptured, with one apical pore.

Type species, *Uredo Behenis* DC. (on *Silene inflata*).

Aecia and telia inhabiting monocotyledonous hosts.
  Host belonging to family Alliaceae.
    Teliospores small, 20–28 μ long.
      Teliospore-wall smooth; pedicel concolorous. 1. *P. Brodiaeae.*
      Teliospore-wall rugose; pedicel hyaline. 2. *P. primaverilis.*
    Teliospores larger, 26–39 μ long, with hyaline pedicel. 3. *P. aurea.*

Host belonging to family Liliaceae.
  Teliospore-wall smooth, evenly thick. — 3. *P. aurea.*
  Teliospore-wall rough, with apical papilla. — 4. *P. Miurae.*
Aecia and telia inhabiting dicotyledonous hosts.
Host belonging to family Polygonaceae. — 5. *P. Rickeriana.*
Host belonging to family Chenopodiaceae. — 6. *P. Atriplicis.*
Host belonging to family Amaranthaceae. — 7. *P. Iresines.*
Host belonging to family Portulacaceae.
  Teliospores fusiform-oblong; wall thin, 1.5–2 μ. — 8. *P. Claytoniae.*
  Teliospores oval; wall moderately thick, 2–3 μ. — 9. *P. Spragueae.*
  Teliospores globoid; wall thick, 3–4 μ. — 10. *P. unita.*
Host belonging to family Ranunculaceae. — 11. *P. Jonesii.*
Host belonging to family Fabaceae.
  Teliospores smooth.
    Teliospores germinating at maturity in the sorus. — 12. *P. montana.*
    Teliospores germinating after a period of rest.
      Teliospores broadly ellipsoid. — 13. *P. Psoraleae.*
      Teliospores fusiform-oblong. — 14. *P. Argophyllae.*
  Teliospores unevenly verrucose, appearing smooth when wet.
    Teliospore-wall more noticeably verrucose toward apex.
      Telia generally long covered by gray epidermis. — 15. *P. oblonga.*
      Telia rather tardily naked but not plumbeous. — 16. *P. nerviphila.*
    Teliospore-wall verrucose in faint lines.
      Teliospores 19–27 μ long, with many verrucose lines. — 17. *P. elegans.*
      Teliospores 23–33 μ long, with few verrucose lines. — 18. *P. carnea.*
  Teliospores minutely verrucose over entire surface.
    Teliospores largely globoid, 19–29 μ long. — 19. *P. Hedysari-obscuri.*
    Teliospores largely ellipsoid, 21–35 μ long. — 20. *P. porosa.*
Host belonging to family Euphorbiaceae. — 21. *P. coordinata.*
Host belonging to family Solanaceae.
  Teliospores rostrate. — 22. *P. venusta.*
  Teliospores rounded or obtuse.
    Teliospore-wall thin, 1.5–2.5 μ. — 23. *P. maculans.*
    Teliospore-wall 2.5–5 μ. — 24. *P. Cestri.*
Host belonging to family Acanthaceae. — 25. *P. Tweediana.*

1. **Pucciniola Brodiaeae** (Ellis & Hark.) Arthur.

Aecidium Brodiaeae Ellis & Hark. Bull. Calif. Acad. **1**: 28. 1884.
Uromyces Brodiaeae Ellis & Hark. Bull. Calif. Acad. **1**: 28. 1884.
Caeomurus Brodiaeae Kuntze, Rev. Gen. **3**^{3}: 449. 1898.
Uromycopsis Brodiaeae Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, rather numerous, scattered among the aecia, small, punctiform, honey-yellow becoming darker, flask-shaped, 74–96 μ in width by 96–112 μ in depth; ostiolar filaments 30–40 μ in length.

I. Aecia amphigenous, densely gregarious in elongate groups on pale-yellow spots up to 3 mm. in length, hemispheric at first then ruptured usually by a longitudinal fissure to become cupulate, low; peridium straw-colored, the margin erect, finely lacerate; peridial cells squarish or rhombic, 16–26 by 23–40 μ, slightly overlapping, the outer wall 7–10 μ thick, transversely striate, the inner wall 3–5 μ thick, strongly verrucose; aeciospores globoid or broadly ellipsoid, 16–26 by 19–27 μ; wall pale-yellow or colorless, 2–3 μ thick, uneven, finely and evenly verrucose.

III. Telia amphigenous, numerous, scattered or crowded into elongate patches, oblong, up to 1 mm. in length and from 0.2–0.3 mm. in diameter, rather tardily naked, opening by a longitudinal splitting of the epidermis, pulverulent, chestnut-brown, ruptured epidermis conspicuous; teliospores globoid or obovoid, sometimes angularly so, 15–24 by 20–28 μ; wall dark cinnamon-brown, of even thickness, 1.5–2 μ, smooth; pedicel concolorous, usually fragile, equaling length of spore.

ON ALLIACEAE:
Triteleia grandiflora Lindl. (*Brodiaea Douglasii* S. Wats.), Idaho, Oregon, Utah, Washington.
Triteleia ixioides (S. Wats.) Greene (*Brodiaea ixioides* S. Wats.), California.
Triteleia laxa (S. Wats.) Benth. (*Brodiaea laxa* S. Wats.), California.
TYPE LOCALITY: Antioch, California, on *Brodiaea laxa*.
DISTRIBUTION: Central California to Idaho and Washington.

2. **Pucciniola primaverilis** (Speg.) Arthur.

Uromyces primaverilis Speg. Anal. Soc. Ci. Argent. **12**: 72. 1881.
Aecidium primaverile Speg. Anal. Soc. Ci. Argent. **12**: 78. 1881.
Uromyces vernalis Speg.; De-Toni, in Sacc. Syll. Fung. **7**: 562. 1888.
Aecidium vernalis Speg.; De-Toni, in Sacc. Syll. Fung. **7**: 562. 1888.
Caeomurus vernalis Kuntze, Rev. Gen. **3**^{3}: 451. 1898.

Uromyces Nothoscordi Sydow, Hedwigia Beibl. **40**: 125. 1901.
Uromycopsis primaverilis Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, numerous, among the aecia, punctiform, wholly immersed, in vertical section globose, 80–110 μ in width; ostiolar filaments free, 50 μ long.

I. Aecia amphigenous, gregarious in large groups, crowded, short-cylindric, 0.2–0.3 mm. across; peridium pale-yellow, the margin erect, irregularly torn; peridial cells rhomboidal in radial section, 16–23 by 26–32 μ, somewhat overlapping, the outer wall 7–9 μ in thickness, transversely striate, the inner wall thinner, 5–7 μ, coarsely tuberculate; aeciospores irregularly globoid or ellipsoid, 15–19 by 19–26 μ; wall pale-yellow or colorless, 1–2 μ thick, minutely and closely verrucose.

III. Telia amphigenous, scattered or somewhat confluent in elongate groups up to 0.5 mm. across, round or oblong, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; teliospores irregularly obovoid or pyriform, 15–22 by 21–25 μ; wall cinnamon-brown, 1.5–2 μ in thickness, thicker at apex up to 4 μ owing to the presence of a semi-hyaline papilla, longitudinally rugose, often appearing faintly longitudinally striate; pedicel colorless, as long as spore, fragile.

ON ALLIACEAE:
Nothoscordum bivalve (L.) Britton (*Allium striatum* Jacq.), Illinois, Missouri, Texas; Mexico (state).
TYPE LOCALITY: Parque de Palermo, Argentina, on *Allium striatellum*.
DISTRIBUTION: Illinois through Missouri to Texas and central Mexico; also in South America.
EXSICCATI: Ellis & Ev. N. Am. Fungi *1864*.

3. **Pucciniola aurea** (Dietel & Holway) Arthur.

Uromyces aureus Dietel & Holway; Dietel, Hedwigia **32**: 30. F 1893.
Uromyces Chlorogali Dietel & Holway; Dietel, Erythea **1**: 248. D 1893.
Caeomurus aureus Kuntze, Rev. Gen. 3^3: 449. 1898.
Uromycopsis aurea Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.
Uromycopsis Chlorogali Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, in small groups, numerous, punctiform, slightly protruding, globoid or flask-shaped, 90–120 μ in width by 80–95 μ in depth; ostiolar filaments 25–50 μ long.

I. Aecia amphigenous, gregarious in oval groups 0.5–1 cm. long on large yellow spots, not crowded, urceolate, 0.3–0.5 mm. in diameter; peridium erect or somewhat revolute, the margin erose or somewhat lacerate; peridial cells rhomboidal, 19–23 by 29–34 μ, the outer wall thick, 8–10 μ, smooth, inconspicuously transversely striate, the inner wall thinner, 5–6 μ, strongly verrucose; aeciospores irregularly and angularly globoid or obovoid, large, 21–29 by 26–40 μ; wall very pale-yellow or colorless, 2.5–3 μ thick, finely and inconspicuously verrucose.

III. Telia amphigenous, at first arising in the midst of the aecia, later surrounding them, oval or oblong, rather small, 0.3–1 mm. long, often crowded and confluent, long covered by the gray epidermis, eventually dehiscent by longitudinal slits, somewhat pulverulent, chocolate-brown; teliospores irregularly and angularly ellipsoid or globoid, 19–32 by 26–39 μ; wall dark cinnamon-brown, of even thickness, 2–3 μ, smooth; pedicel slender, fragile, hyaline, as long as spore or less.

ON ALLIACEAE:
Allium validum S. Wats., California.
ON LILIACEAE:
Chlorogalum pomeridianum Kunth, California.
TYPE LOCALITY: King's River Canyon, California, on *Allium validum*.
DISTRIBUTION: Central California.
EXSICCATI: Barth. N. Am. Ured. *590, 1585;* Ellis & Ev. N. Am. Fungi *2985;* Sydow, Ured. *851, 852, 1755*.

4. **Pucciniola Miurae** (Sydow) Arthur.

Uromyces Miurae Sydow, Ann. Myc. **11**: 94. 1913.

O and I. Pycnia and aecia unknown.

III. Telia amphigenous or petiolicolous, numerous, occasionally crowded in groups of two or three sori, round or broadly ellipsoid, 0.2–0.7 mm. across, tardily naked, finally dehiscent by longitudinal rents in the epidermis, pulvinate, becoming pulverulent, cinnamon-brown,

DISTRIBUTION: Southern Wyoming to northern New Mexico.
EXSICCATI: Barth. N. Am. Ured. *401, 1981, 1982;* Ellis & Ev. Fungi Columb. *1294;* D. Griff. W. Am. Fungi *321.*

7. **Pucciniola Iresines** (Lagerh.) Arthur.

Uromyces Iresines Lagerh.; Sydow, Monog. Ured. 2: 227. 1910.

O. Pycnia unknown.

I. Aecia epiphyllous, gregarious on pale spots, 2–4 mm. across, opening by a pore, definitely globoid, 190–220 μ in diameter, surrounded and overarched by the host-tissue; peridium wanting; aeciospores irregularly ellipsoid, 18–21 by 25–31 μ; wall pale or nearly colorless, thin, 1 μ, moderately verrucose with distinct rather blunt warts.

III. Telia epiphyllous or amphigenous, few, at first surrounding the aecia, later occasionally concentric in circular groups on round or irregular pale spots, minute, 0.5 mm. in diameter, early naked, compact, brown, becoming cinereous upon germination; teliospores ellipsoid, obovoid, or clavate, 16–20 by 24–32 μ, rounded above, rounded or narrowed below, germinating at maturity; wall colorless, thin, about 1 μ, 3–4 μ thick at apex, smooth; pedicel hyaline, somewhat persistent, up to 65 μ in length.

ON AMARANTHACEAE:
Iresine Celosia L. (*I. celosioides* L.), Guatemala.
Iresine elatior Rich., St. Thomas.
TYPE LOCALITY: Quito, Ecuador, on *Iresine* sp.
DISTRIBUTION: Guatemala and Island of St. Thomas; also in South America.

8. **Pucciniola Claytoniae** (Cooke & Peck) Arthur.

Uromyces Claytoniae Cooke & Peck; Peck, Ann. Rep. N. Y. State Mus. 29: 50. 1878.

O. Pycnia epiphyllous, crowded in groups 1–2 mm. across, conspicuous, chocolate-brown, ellipsoid or globoid, 80–112 by 112–135 μ; ostiolar filaments rather inconspicuous, up to 55 μ long.

I. Aecia amphigenous, grouped around the pycnia, cupulate, 0.6–0.8 mm. in diameter, 0.3–0.5 mm. high; peridium yellowish, not projecting much above the ruptured epidermis, the margin erose; peridial cells irregularly oblong in radial section, 26–32 by 29–51 μ, abutted, the outer wall 12–16 μ thick, transversely striate, the inner wall 3–6 μ thick, closely and finely verrucose; aeciospores broadly ellipsoid, 18–24 by 23–29 μ; wall colorless, 1.5–3 μ thick, very finely and closely verrucose.

III. Telia amphigenous, scattered, oval or oblong, 0.5–1 mm. long, early naked, somewhat pulverulent, dark cinnamon- or chestnut-brown, ruptured epidermis evident; teliospores fusiform-oblong or fusiform-ellipsoid, 19–26 by 29–45 μ, narrowed above and below; wall dark cinnamon-brown, 1.5–2 μ thick, thickened at apex into a 3–6 μ thick colorless papilla, conspicuously longitudinally verrucose-rugose when dry, somewhat inconspicuous when wet; pedicel colorless, fragile, about as long as spore.

ON PORTULACACEAE:
Claytonia caroliniana Michx., New York.
TYPE LOCALITY: Cold Spring, New York, on *Claytonia caroliniana.*
DISTRIBUTION: Known only from the type locality.

9. **Pucciniola Sprague**ae (Hark.) Arthur.

*Uromyces Sprague*ae Hark. Bull. Calif. Acad. 1: 36. 1884.
*Caeomurus Sprague*ae Kuntze, Rev. Gen. 3³: 450. 1898.
*Uromycopsis Sprague*ae Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia hypophyllous or somewhat amphigenous, scattered or in small or sometimes extended clusters, conspicuous, cylindric, about 0.2 mm. in diameter, 0.2–0.5 mm. high; peridium pale-yellow or colorless, the margin erect or slightly recurved, entire or erose; peridial cells oblong in radial section, 15–23 by 23–27 μ, overlapping, the outer wall rather thick, 7–10 μ, smooth, transversely striate, the inner wall thinner, 3–5 μ, finely verrucose; aeciospores globoid or irregular, 15–19 by 16–23 μ; wall pale-yellow or colorless, thin, 1–1.5 μ, uniform, finely and closely verrucose.

III. Telia amphigenous, numerous, at first intermixed with the aecia, singly or con-

fluent in groups of considerable size up to 2 mm. across, roundish or irregularly bullate, 0.2–0.8 mm. across, for a time covered by the gray epidermis, finally pulverulent, chocolate-brown, ruptured epidermis evident; teliospores oval or obovate-oblong, 19–26 by 24–35 μ, rounded or obtuse at both ends or narrowed below; wall chestnut-brown, rather thick, 2–3 μ, somewhat thicker above, 3–5 μ, closely and evenly verrucose, more strongly toward apex, the markings arranged in longitudinal rows giving a striate appearance; pedicel colorless, delicate, evanescent, except for a small portion next to spore.

ON PORTULACACEAE:
Calyptridium roseum S. Wats., Oregon.
Calyptridium umbellatum Greene (*Spraguea umbellata* Torr.), California.
Spraguea multiceps Howell, Oregon, Wyoming.

TYPE LOCALITY: Sierra Nevada, California, 2100 meters altitude, on *Spraguea umbellata*.
DISTRIBUTION: Eastern Oregon to western Wyoming, and southward to central California.
EXSICCATI: Barth. N. Am. Ured. *1297;* Ellis & Ev. N. Am. Fungi *1870;* Rab.-Wint. Fungi Eur. *3309;* Rab.-Wint.-Paz. Fungi Eur. *3933*.

10. **Pucciniola unita** (Peck) Arthur.

Uromyces unitus Peck, Bull. Torrey Club. **10**: 74. 1883.
Caeomurus unitus Kuntze, Rev. Gen. **3**^{3}: 451. 1898.
Uromycopsis unita Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia amphigenous, in extended groups, crowded, short, cylindric, 0.2–0.3 mm. in diameter; peridium pale-yellow or colorless, delicate, the margin erect, entire or erose; peridial cells oblong in radial section, 19–29 by 23–34 μ, overlapping, the outer wall of considerable thickness, 9–13 μ, smooth, transversely striate, the inner wall thinner, 3–7 μ, strongly verrucose; aeciospores globoid, angularly globoid or irregular, 13–18 by 16–25 μ; wall colorless or occasionally very pale-yellow, of uniform thickness, 1.5–2 μ, very minutely verrucose, appearing almost smooth when wet.

III. Telia amphigenous, numerous, at first intermixed with the aecia, often crowded in groups of considerable size, appearing almost confluent, round, 0.2–0.6 mm. in diameter, early naked, pulverulent, blackish-brown, ruptured epidermis noticeable; teliospores globoid or quite broadly ellipsoid, 21–30 by 23–32 μ, rounded above and below; wall chocolate-brown, thick, 3–4 μ, thickened at apex into a slightly lighter umbo, 5–9 μ, very minutely verrucose, sometimes appearing almost smooth when wet; pedicel shorter than spore, nearly colorless.

ON PORTULACACEAE:
Lewisia columbiana (Howell) B. L. Robinson (*Calandrinia columbiana* Howell), Washington.
Lewisia rediviva Pursh, Montana.

TYPE LOCALITY: Washington, on "*Calandrinia Leana*," error for *C. columbiana*.
DISTRIBUTION: Western Montana and one station in Washington.
EXSICCATI: Barth. N. Am. Ured. *1100;* Ellis & Ev. Fungi Columb. *1373;* Ellis & Ev. N. Am. Fungi *2407*.

11. **Pucciniola Jonesii** (Peck) Arthur.

Uromyces Jonesii Peck, Bot. Gaz. **7**: 45. 1882.
Caeomurus Jonesii Kuntze, Rev. Gen. **3**^{3}: 450. 1898.
Uromycopsis Jonesii Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia hypophyllous, numerous, scattered among the aecia, small, punctiform, noticeable, honey-yellow becoming darker, globoid, 55–130 μ wide by 55–115 μ in depth; ostiolar filaments agglutinated to form a column 50–65 μ in diameter and 65–70 μ high.

I. Aecia mainly hypophyllous, from a diffused mycelium, often completely covering the under surface of the leaf, cupulate, low, 0.1–0.3 mm. in diameter; peridium pale-yellow, the margin recurved, lacerate; peridial cells oblong, rather small, 15–16 by 19–23 μ, somewhat overlapping, the outer wall 3–5 μ, smooth, the inner wall thinner, 1–2 μ, finely and closely verrucose; aeciospores angularly globoid, 16–23 by 21–26 μ; wall pale-yellow or colorless, 1–1.5 μ thick, finely and inconspicuously verrucose, appearing almost smooth when wet.

III. Telia amphigenous, rather numerous, scattered, round, 0.1–0.7 mm. in diameter, long covered by the epidermis, pulvinate becoming pulverulent, reddish-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid, globoid or obovoid, 19–26 by 24–35 μ, rounded above, rounded or tapering below; wall cinnamon-brown, 1.5–2.5 μ thick, uniform, moderately and strongly verrucose, appearing warty; pedicel hyaline, short, fragile.

ON RANUNCULACEAE:
Ranunculus alismaefolius Geyer, Colorado.
Ranunculus alismellus (A. Gray) Greene (*R. alismaefolius alismellus* A. Gray), California.
Ranunculus Hartwegii Greene, California.
TYPE LOCALITY: Soda Springs, California, on *Ranunculus* [*alismellus*].
DISTRIBUTION: Central California to northwestern Colorado.
EXSICCATI: Barth. N. Am. Ured. *1390;* Ellis & Ev. Fungi Columb. *1471;* D. Griff. W. Am. Fungi *327;* Seym. & Earle, Econ. Fungi Suppl. *B3;* Sydow Ured. *755.*

12. **Pucciniola montana** Arthur.

Uromyces montanus Arth. Bot. Gaz. **39**: 386. 1905.
Telospora montana Arth. Résult. Sci. Congr. Bot. Vienne 346. 1906.

O. Pycnia amphigenous, gregarious upon yellowish spots, 1.5–4 mm. in diameter, conspicuous, light-brown, globoid or flattened-globoid, 115–241 by 128–190 μ; ostiolar filaments 80–144 μ long; pycniospores colorless, ellipsoid, 3 by 4 μ.

I. Aecia occasionally amphigenous, usually hypophyllous, gregarious on discolored areas 1.5–4 mm. in diameter, short-cylindric, 0.2–0.6 mm. in diameter; peridium slightly yellowish, the margin erose; peridial cells rectangular, 10–24 by 26–45 μ, abutted or slightly overlapping, the outer wall 5–10 μ thick, transversely striate, the inner wall 1.5–4 μ thick, verrucose; aeciospores irregularly globoid, ellipsoid, or oblong, 16–29 by 23–37 μ; wall pale-yellow or colorless, rather thick, 1.5–3 μ, closely and finely verrucose.

III. Telia hypophyllous, crowded in circinating or irregular groups, roundish or oval, small, 0.2–0.7 mm. across, early naked, not pulverulent, cinnamon-brown at the margin of the groups, dark and cinereous from germination within, ruptured epidermis not noticeable; teliospores ellipsoid or obovoid, 17–24 by 26–42 μ, narrowed or rounded at both ends; wall pale-brownish or almost colorless, thin, 1–1.5 μ, thickened at apex, 4–8 μ, smooth; pedicel colorless, up to length of spore.

ON FABACEAE:
Lupinus Ehrenbergii Schlecht., Hidalgo.
Lupinus mexicanus H.B.K. (*L. vaginatus* Cham. & Schlecht.), Mexico (state).
Lupinus montanus H.B.K., Guatemala.
TYPE LOCALITY: Nevada de Toluca, Mexico (state), on *Lupinus mexicanus*.
DISTRIBUTION: Southern Mexico and Central America.
EXSICCATI: Barth. Fungi Columb. *2597;* Sydow, Ured. *1961.*

13. **Pucciniola Psoraleae** (Peck) Arthur.

Uromyces Psoraleae Peck, Bot. Gaz. **6**: 239. 1881.
Caeomurus Psoraleae Kuntze, Rev. Gen. **3**^{3}: 450. 1898.
Uromycopsis Psoraleae Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia hypophyllous, very abundant, scattered among the aecia or preceding them, large, papilliform, immersed or somewhat raised above the surface, quite conspicuous, honey-yellow becoming darker, globoid, 100–130 μ in diameter; ostiolar filaments agglutinated into a column 80–100 μ high.

I. Aecia hypophyllous, numerous, evenly scattered over large areas, cupulate, low, 0.1–0.4 mm. in diameter; peridium pale-yellow, the margin somewhat revolute, deeply lacerate; peridial cells oblong in radial section, 16–19 by 26–34 μ, overlapping, the outer wall 7–10 μ thick, smooth, the inner wall thinner, 3–6 μ, closely verrucose; aeciospores irregular or oblong-globoid, 15–23 by 18–29 μ; wall pale-yellow or colorless, of uniform thickness, 1–1.5 μ, finely and inconspicuously verrucose.

III. Telia amphigenous or petiolicolous, rather few, scattered, round or ellipsoid, 0.2–1 mm. across, early naked, somewhat pulverulent, dark chestnut-brown, ruptured epidermis evident; teliospores globoid or broadly ellipsoid, 21–26 by 26–42 μ, rounded above, rounded or narrowed below; wall dark cinnamon-brown, 2–2.5 μ thick, sometimes with a slight umbo over the apical pore, 2–3 μ, smooth; pedicel colorless, up to 30 μ in length, tapering, 5–7 μ wide at the point of attachment, more usually fragile and broken away.

ON FABACEAE:
Psoralidium lanceolatum (Pursh) Rydb. (*Psoralea lanceolata* Pursh), Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, South Dakota, Utah, Wyoming.
Psoralidium micranthum (A. Gray) Rydb. (*Psoralea micrantha* A. Gray), Arizona, New Mexico, Utah.
Psoralidium Purshii (Vail) Rydb. (*Psoralea Purshii* Vail), Wyoming.

TYPE LOCALITY: [Salt Lake City], Utah, on *Psoralea lanceolata*.
DISTRIBUTION: Southwestern South Dakota to Idaho and southward to Colorado and Utah.
EXSICCATI: Barth. Fungi Columb. *2295, 4995;* Barth. N. Am. Ured. *2198;* Clements, Crypt. Form. Colo. *315;* Ellis & Ev. Fungi Columb. *2106;* Garrett, Fungi Utah. *248;* Sydow. Ured. *2107*.

14. **Pucciniola Argophyllae** (Seym.) Arthur.

Aecidium Psoraleae Peck; Parry, Am. Nat. 8: 215. 1874. Not (*Uromyces Psoraleae* Peck, 1881).
Uromyces Argophyllae Seym. Proc. Bost. Soc. Nat. Hist. 24: 185. 1889.
Caeomurus Argophyllae Kuntze, Rev. Gen. 3^3: 449. 1898.

O. Pycnia hypophyllous, very abundant, scattered among the aecia or preceding them, large, papilliform, immersed or somewhat raised above the surface, quite conspicuous, honey-yellow, becoming darker, globoid, 120–145 μ in diameter; ostiolar filaments agglutinated into a column 80–100 μ high.

I. Aecia hypophyllous, very numerous, evenly scattered over large areas or sometimes slightly crowded, cupulate, low, 0.2–0.4 mm. in diameter; peridium pale-yellow, the margin quite strongly recurved, deeply lacerate; peridial cells in radial section rectangular or square, 15–21 by 19–26 μ, overlapping, the outer wall 5–9 μ thick, smooth, the inner wall thinner, 3–5 μ, rather closely verrucose; aeciospores angularly globoid, 15–23 by 18–24 μ; wall colorless, 1.5–2 μ thick, uniform, finely and inconspicuously verrucose.

III. Telia amphigenous, quite numerous, scattered, round, small, 0.1–0.3 mm. in diameter, often inconspicuous, rather early naked, pulverulent, chestnut-brown, ruptured epidermis evident; teliospores oblong or fusiform-oblong, 13–21 by 26–39 μ, acute or sometimes rounded above, rounded or acute below; wall light cinnamon- or golden-brown, 1.5–2 μ thick, thicker at apex, 2–3 μ, with a low semi-hyaline papilla over the pore, smooth; pedicel hyaline, short, caducous.

ON FABACEAE:
Pediomelum cuspidatum (Pursh) Rydb. (*Psoralea cuspidata* Pursh), Colorado, South Dakota.
Pediomelum mephiticum (S. Wats.) Rydb. (*Psoralea mephitica* S. Wats.), Colorado.
Psoralidium argophyllum (Pursh) Rydb. (*Psoralea argophylla* Pursh), Iowa, Kansas, Minnesota, Nebraska, North Dakota, South Dakota.
Psoralidium Bigelovii Rydb. (*Psoralea obtusiloba* Vail, not T. & G.), Arizona.
Psoralidium collinum Rydb. (*Psoralea collina* Rydb.), Nebraska.
Psoralidium floribundum (Nutt.) Rydb. (*Psoralea floribunda* Nutt.), Colorado, Illinois, Kansas, Montana, Texas.
Psoralidium linearifolium (T. & G.) Rydb. (*Psoralea linearifolia* T. & G.), South Dakota.
Psoralidium tenuiflorum (Pursh) Rydb. (*Psoralea tenuiflora* Pursh), Arizona, Colorado, Illinois, Kansas, Montana, Nebraska, Wyoming.

TYPE LOCALITY: Valley City, [North] Dakota, on *Psoralea argophylla*.
DISTRIBUTION: Minnesota to Illinois and Texas, and westward to the eastern Rocky Mountain states.
EXSICCATI: Barth, Fungi Columb. *2396, 2094, 3595, 4895;* Barth. N. Am. Ured. *101, 205, 800, 994, 1097, 1895;* Brenckle, Fungi Dak. *3, 73;* Clements, Crypt. Form. Colo. *315;* Ellis & Ev. N. Am. Fungi *1818, 1862;* Ellis & Ev. Fungi. Columb. *60, 557, 1596, 1803, 1909;* D. Griff. W. Am. Fungi *67, 189, 258;* Sydow, Ured. Exot. *328*.

15. **Pucciniola oblonga** (Vize) Arthur.

Uromyces oblongus Vize, Grevillea 5: 110. 1877.
Uromyces minor Schroet. Krypt. Fl. Schles 3^1: 310. 1887.
Caeomurus minor Kuntze, Rev. Gen. 3^3: 450. 1898.
Caeomurus oblongus Kuntze, Rev. Gen. 3^3: 450. 1898.
Uromycopsis minor Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia mostly hypophyllous, scattered unevenly over the surface of the leaf, often in groups, 0.4–2.5 mm. across, cupulate, low, 0.1–0.4 mm. in diameter; peridium pale, the margin somewhat revolute, finely erose; peridial cells in radial section square or oblong, 15–21 by 16–24 μ, abutted or overlapping only moderately, the outer wall 6–8 μ thick, smooth, transversely striate, the inner wall thinner, 3–5 μ, moderately verrucose; aeciospores angular-globoid, oblong, or ellipsoid, 12–16 by 13–19 μ; wall pale-yellow or colorless, thin, 1–1.5 μ, minutely verrucose, appearing smooth when wet.

III. Telia mostly hypophyllous and caulicolous, following closely upon the appearance of the aecia and usually intermixed with them, large, bullate, elongate in the direction of the veins of the leaf, 0.2–2 mm. in length, long covered with the gray epidermis, finally pulverulent, chestnut-brown, ruptured epidermis conspicuous; teliospores angular-globoid, broadly

ellipsoid or obovoid, 13–19 by 16–24 μ, rounded above and below, or somewhat narrowed below; wall cinnamon- or chestnut-brown, 1.5–2 μ thick, occasionally slightly thickened at apex, 2–4 μ, with a very low semi-hyaline umbo over the apical pore, very minutely and inconspicuously roughened; pedicel short, broad where attached to spore, tapering, fragile, colorless.

ON FABACEAE:
Trifolium Aitonii Rydb., Montana.
Trifolium albopurpureum T. & G., California, Oregon.
Trifolium amplectens T. & G., California.
Trifolium andinum Nutt., Wyoming.
Trifolium bifidum A. Gray, California.
Trifolium bifidum decipiens Greene, California.
Trifolium Breweri S. Wats., California.
Trifolium ciliatum Nutt. (*T. ciliolatum* Benth.), California.
Trifolium dasyphyllum Torr., Colorado.
Trifolium depauperatum Desv., California.
Trifolium dubium Sibth., California, Oregon, Washington.
Trifolium eriocephalum Nutt., Oregon.
Trifolium Fendleri Greene (*T. involucratum* Ortega), Colorado, Nevada.
Trifolium gracilentum T. & G., California.
Trifolium gymnocarpon Nutt., Arizona, Colorado.
Trifolium Hallii Howell, Oregon.
Trifolium Macraei Hook. & Arn., California.
Trifolium microcephalum Pursh, California.
Trifolium microdon Hook. & Arn., California, Oregon; British Columbia.
Trifolium obtusiflorum Hook. (*T. roscidum* Greene), California.
Trifolium oliganthum Steud. (*T. pauciflorum* Nutt.), California, Nevada, Oregon, Utah, British Columbia.
Trifolium Parryi A. Gray, Colorado, Utah.
Trifolium procumbens L., Oregon.
Trifolium Rydbergii Greene, Colorado, Montana.
Trifolium scariosum A. Nelson, Utah.
Trifolium stenophyllum Nutt., California.
Trifolium tridentatum Lindl., California, Oregon.
Trifolium variegatum Nutt., California, Nevada, Washington.
Trifolium Wormskjoldii Lehm., California.

TYPE LOCALITY: California, on "burr cloves," typographical error for burr clover, *i.e.*, *Medicago hispida*, error for *Trifolium* (*dubium?*).

DISTRIBUTION: Throughout the Rocky Mountains and along the Pacific coast; also in Europe and Japan.

ILLUSTRATION: Beitr. Krypt. Schweiz 2^2: *f. 20.*

EXSICCATI: Barth. Fungi Columb. *2798, 4496;* Barth. N. Am. Ured. *195, 694, 794, 1195, 1394; 1597, 1994;* Clements, Crypt. Form. Colo. *538;* Ellis & Ev. N. Am. Fungi *1875, 1875b, 2409;* Ellis & Ev. Fungi Columb. *1797;* Garrett, Fungi Utah. *224, 225;* D. Griff. W. Am. Fungi *365;* Rab.-Wint.-Paz. Fungi Eur. *4038;* Sydow, Ured. *859, 860, 1762.*

16. **Pucciniola nerviphila** (Grognot) Arthur.

Puccinia nerviphila Grognot, Pl. Crypt. Saône-et-Loire 154. 1863.
Puccinia neurophila Grognot; De-Toni, in Sacc. Syll. Fung. **7**: 698. 1898.
Dicaeoma neurophilum Kuntze, Rev. Gen. 3^3: 469. 1898.
Uromyces flectens Lagerh. Sv. Bot. Tidskr. **3**: 36. 1909.

O. Pycnia hypophyllous, petiolicolous, rather numerous, usually scattered among the aecia, honey-yellow becoming darker, inconspicuous, globoid or oblate-sphaeroid, 80–145 μ in width, 65–145 μ in height; ostiolar filaments in somewhat of a column up to 70 μ in length.

I. Aecia mostly hypophyllous or sometimes petiolicolous, scattered unevenly or in groups 0.5–2 mm. in diameter, often following mid-ribs or veins, cupulate, low, 0.1–0.3 mm. in diameter; peridium pale, darkening with age, the margin slightly recurved, finely erose; peridial cells oblong in radial section, 13–16 by 19–21 μ, somewhat overlapping, the outer wall 7–9 μ thick, smooth, transversely striate, the inner wall somewhat thinner, about 3 μ, finely verrucose; aeciospores angular-globoid, oblong, or irregular, 13–16 by 15–21 μ; wall pale-yellow or colorless, thin, 1–1.5 μ, very finely verrucose.

III. Telia hypophyllous or petiolicolous for the most part, rather sparsely scattered or confluent in elongate patches 0.5–3 mm. in length, elliptic, 0.2–0.5 mm. long, tardily naked, pulverulent, light chestnut-brown, ruptured epidermis conspicuous; teliospores globoid, broadly ellipsoid, or obovoid, 15–23 by 21–27 μ, rounded above, narrowed slightly or rounded below; wall cinnamon-brown, 1.5–2 μ thick, with a low subhyaline papilla over the pore, 2–4 μ, very minutely and inconspicuously verrucose, appearing smooth; pedicel short, deciduous, hyaline.

ON FABACEAE:
Trifolium repens L., Colorado, New York, Wisconsin; Ontario.
TYPE LOCALITY: France, on "trèfles" [probably *Trifolium repens*].
DISTRIBUTION: Locally from the northeastern United States westward through Ontario and Wisconsin to the foothills of the Rocky Mountains in Colorado.

17. **Pucciniola elegans** (Berk.) Arthur.

Aecidium Orobi elegans Berk. Grevillea **3**: 61. 1874.
Uromyces elegans Lagerh. Tromsö Mus. Aarsh. **17**: 34. 1895.
Caeomurus elegans Kuntze, Rev. Gen. **3**^{3}: 450. 1898.
Uromycopsis elegans Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia hypophyllous, scattered evenly over large areas, short, cupulate, 0.2–0 3 mm. in diameter; peridium white, darkening with age to pale-brown, the margin somewhat recurved, finely erose; peridial cells rhomboidal, 12–13 by 19–24 μ, slightly overlapping, often abutted, the outer wall rather thick, 5–9 μ, smooth and transversely striate, the inner wall thinner, 3–5 μ, finely verrucose; aeciospores broadly ellipsoid, globoid, or somewhat angular, 10–19 by 13–21 μ; wall very light-yellow or colorless, 1–1.5 μ thick, very finely and inconspicuously verrucose.

III. Telia amphigenous and caulicolous, numerous, scattered or sometimes crowded in groups of two or three sori, oval or round; variable in size, 0.2–1. mm. in diameter, rather tardily naked, pulvinate, becoming pulverulent, chestnut-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid or obovate-ellipsoid, often angular, 15–19 by 19–27 μ; wall cinnamon- or chestnut-brown, 1.5–2 μ thick, thicker at apex, about 2.5 μ, with a low, concolorous papilla over the apical pore, sparsely and unevenly papillate-verrucose in faint longitudinal lines 5–7 μ apart; pedicel colorless, up to 18 μ in length, usually collapsed, fragile, broad at point of attachment, 7–9 μ, tapering.

ON FABACEAE:
Trifolium arvense L., Alabama, Mississippi.
Trifolium carolinianum Michx., Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, Texas.
TYPE LOCALITY: South Carolina, on *Trifolium carolinianum*.
DISTRIBUTION: South Carolina southward to the Gulf and westward to Texas.
EXSICCATI: Rav. Fungi Am. *727;* Seym. & Earle Econ. Fungi *508a, b;* Thüm. Myc. Univ. *1024.*

18. **Pucciniola carnea** (Nees) Arthur.

Aecidium carneum Nees; Funck, Crypt. Gew. Fichtelgeb. **25**: 4. 1818.
Aecidium Astragali Thüm. Myc. Univ. *1117.* 1878.
Aecidium Astragali Eriksson, Fungi Paras. Scand. *285.* 1888.
Uromyces lapponicus Lagerh. Bot. Not. **1890**: 274. 1890.
Aecidium Astragali-alpini Eriksson, Bot. Not. **1891**: 43. 1891.
Uromyces carneus Hariot, Journ. de Bot. **7**: 376. 1893.
Uromyces splendens A. Blytt, Forh. Vid.-Selsk. Christ. **1896**^{6}: 39. 1896.
Uromycopsis lapponicus Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia hypophyllous and caulicolous, numerous, scattered over most of the leaf, conspicuous, globoid or flattened-globoid, 112–144 by 96–128 μ; ostiolar filaments agglutinated into a column, up to 112 μ long.

I. Aecia hypophyllous or caulicolous, densely and usually evenly scattered, arising from a diffused mycelium, usually occupying all of the under surface of infected leaf, cupulate, 0.5–0.8 mm. in diameter, 0.2–0.3 mm. high; peridium whitish or yellowish, the margin remaining more or less incurved and covered by the epidermis, erose; peridial cells broadly oblong or rhomboidal in radial section, 16–29 by 19–32 μ, slightly overlapping or abutted, the outer wall 7–12 μ thick, transversely striate, the inner wall 3–5 μ thick, closely verrucose; aeciospores irregularly globoid or ellipsoid, 13–20 by 16–26 μ; wall colorless, thin, 1–1.5 μ, closely and finely verrucose.

III. Telia mostly hypophyllous, scattered, round or oval, 0.3–1 mm. across, early naked, somewhat pulverulent, dark cinnamon-brown, ruptured epidermis evident; teliospores broadly ellipsoid or oblong, 19–23 by 23–33 μ, rounded above and below; wall cinnamon-brown, 1.5–2 μ thick, thickened into a small colorless papilla over the pore, 3–5 μ thick, verrucose in a few irregular longitudinal lines 5–10 μ apart; pedicel colorless, fragile.

ON FABACEAE:
Aragallus albiflorus A. Nelson, Colorado.
Astragalus sp., Alaska, Oregon.
Atelophragma Macounii Rydb. (*Astragalus Macounii* Rydb.), Alberta.
Homalobus flexuosus (Dougl.) Rydb. (*Astragalus flexuosus* Dougl.), Colorado.
Tium alpinum (L.) Rydb. (*Astragalus alpinus* L.), Colorado, Idaho.
TYPE LOCALITY: Fichtel Mountains, Germany, on *Astragalus alpinus*.
DISTRIBUTION: Rocky Mountains from Colorado northward to Alaska; also in Europe and Asia.
ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 18*.

19. **Pucciniola Hedysari-obscuri** (DC.) Arthur.

Puccinia Hedysari-obscuri DC.; Syn. Pl. Gall. 46. 1806.
Uredo Hedysari-obscuri DC.; Poir. in Lam. Encyc. **8**: 222. 1808.
Aecidium Leguminosarum Unger, Einfl. Bodens 221, hyponym. 1836.
Uromyces Hedysari-obscuri Carest. & Picc. Erb. Critt. Ital. II. *447*. 1871.
Uromyces Hedysari Fuckel, Jahrb. Nass. Ver. Nat. **29–30**: 15. 1875.
Uromyces borealis Peck, Bot. Gaz. **6**: 276. 1881.
Uromyces Hazslinszkii De-Toni, in Sacc. Syll. Fung. **7**: 565. 1888.
Caeomurus Hazslinszkii Kuntze, Rev. Gen. 3^3: 450. 1898.
Caeomurus Hedysari Kuntze, Rev. Gen. 3^3: 450. 1898.
Uromyces astragalicola P. Henn. Hedwigia **37**: 268. 1898.
Uromycopsis astragalicola Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.
Uromycopsis Hedysari-obscuri Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia mostly epiphyllous, few, gregarious in small groups, inconspicuous, brownish, globoid, 90–144 by 90–160 μ; ostiolar filaments short, 48–64 μ.

I. Primary aecia amphigenous or petiolicolous, crowded in groups 0.2–1 cm. across; secondary aecia amphigenous, scattered or in small groups 0.8–1.5 mm. across, cupulate or short-cylindric, 0.1–0.5 mm. in diameter; peridium yellowish, the margin erose; peridial cells short-rectangular or rhombic in radial section, 13–19 by 15–32 μ, abutted or overlapping, the outer wall 7–9 μ thick, transversely striate, the inner wall 3–6 μ thick, closely and finely verrucose; aeciospores angularly globoid or ellipsoid, 13–19 by 15–19 μ; wall colorless, thin, 1 μ, closely and finely verrucose.

III. Telia mostly epiphyllous, scattered or circinating about the secondary aecia, round or oval, 0.1–0.8 mm. across, early naked, pulverulent, dark chocolate-brown, ruptured epidermis noticeable; teliospores globoid, ellipsoid, or oblong, 14–18 by 19–29 μ, rounded above and below; wall chestnut-brown, 1.5–2.5 μ thick, covered at apex with a lighter-colored umbo, 3–7 μ thick, very finely and closely verrucose; pedicel colorless, short, fragile.

ON FABACEAE:
Hedysarum americanum (Michx.) Britton (*H. philoscia* A. Nelson), Idaho, Montana, Wyoming; Alberta.
Hedysarum cinerascens Rydb., Montana, North Dakota, Utah, Wyoming; Alberta.
Hedysarum Mackenzii Richards., Alberta.
Hedysarum marginatum Greene (*H. uintahense* A. Nelson), Colorado, Wyoming.
Hedysarum pabulare A. Nelson, Colorado, New Mexico, Utah.
Hedysarum sulphurescens Rydb. (*H. flavescens* Coult. & Fisher), Montana; Alberta.
Hedysarum utahense Rydb., Utah.
TYPE LOCALITY: France, on *Hedysarum obscurum*.
DISTRIBUTION: Rocky Mountain region from Alberta to northern New Mexico; also in Europe and Asia.
ILLUSTRATION: Beitr. Krypt. Schweiz 2^2: *f. 21*.
EXSICCATI: Barth. Fungi Columb. *4891, 4892;* Barth. N. Am. Ured. *1191, 1491, 1985, 1986;* Brenckle, Fungi Dak. *425;* Clements, Crypt. Form. Colo. *535;* Ellis & Ev. Fungi Columb. *1695;* Garrett, Fungi Utah. *197;* D. Griff. W. Am. Fungi *363;* Sydow, Ured. *1552*.

20. **Pucciniola porosa** (Peck) Arthur.

Aecidium porosum Peck, Bot. Gaz. **3**: 34. 1878.
Uromyces coloradensis Ellis & Ev. Erythea **1**: 204. 1893.
Uromyces albus Dietel & Holway; Dietel, Hedwigia **36**: 297. 1897.
Caeomurus coloradensis Kuntze, Rev. Gen. 3^3: 450. 1898.
Uromyces valesiacus Ed. Fisch. Bull. Herb. Boiss. II. **2**: 953. 1902.
Uromycopsis porosa Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.
Uromyces porosus H. S. Jackson, Brooklyn Bot. Gard. Mem. **1**: 281. 1918.

O. Pycnia hypophyllous, numerous, scattered among the aecia or preceding them, small, punctiform, half immersed, honey-yellow or darker, globoid, 115–125 μ in diameter; ostiolar filaments aggultinated into a column about 60 μ long.

I. Aecia hypophyllous, evenly scattered over large areas from a distributed mycelium,

low, cupulate, 0.2–0.5 mm. in diameter; peridium white, becoming honey-yellow or slightly darker upon aging, the margin recurved, erose; peridial cells oblong in radial section, 15–24 by 24–29 μ, slightly overlapping, the outer wall 5–9 μ thick, transversely striate, the inner wall thinner, 2.5–4 μ, moderately verrucose; aeciospores ellipsoid, globoid, oblong, or irregular, 15–19 by 18–26 μ; wall pale-yellow or colorless, 1–1.5 μ thick, uniform, finely and closely verrucose.

III. Telia rather numerous, epiphyllous, caulicolous, occasionally hypophyllous, scattered, round or elliptic, 0.1–1 mm. across, somewhat tardily naked, pulverulent, chestnut-brown, ruptured epidermis conspicuous; teliospores (plains form) ellipsoid or obovoid, 13–21 by 21–27 μ; wall cinnamon-brown, 1–1.5 μ thick, 3–5 μ at apex because of a cap-like semi-hyaline umbo; (mountain form) broadly ellipsoid, obovoid, or globoid, 18–24 by 24–32 μ; wall light chestnut-brown, 1.5–2 μ thick, 5–7 μ at apex because of a cap-like semi-hyaline umbo; (Pacific slope form) globoid, obovoid or irregular, 19–24 by 24–35 μ; wall chestnut-brown, 2–3 μ thick, 6–9 μ at apex because of a cap-like semi-hyaline umbo; all three forms finely and closely verrucose with the markings arranged in longitudinal lines; pedicel hyaline, short, fragile.

ON FABACEAE:
Vicia americana Muhl., Arizona, California, Colorado, Indiana, Iowa, Kansas, Minnesota, Montana, Nebraska, New Mexico, Oregon, South Dakota, Utah, Washington, Wisconsin; Alberta, British Columbia.
Vicia californica Greene, California.
Vicia oregana Nutt. (*V. truncata* Nutt.), Colorado, Nevada, Utah, Wyoming; Ontario.
Vicia sparsifolia Nutt. (*V. linearis* Greene), Colorado, Iowa, Kansas, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, Washington; Saskatchewan.
Vicia trifida D. Dietr. (*V. caespitosa* A. Nelson), Utah, Wyoming.
TYPE LOCALITY: Colorado, on *Vicia americana*.
DISTRIBUTION: From Ontario to Indiana, and westward to the Pacific coast; also in Europe.
EXSICCATI: Barth. N. Am. Ured. *201, 585, 586, 981, 982, 1783, 1886;* Barth. Fungi Columb. *3888, 4089, 4990;* Brenckle, Fungi Dak. *191, 191a, 205;* Clements, Crypt. Form. Colo. *590;* Ellis, N. Am. Fungi *1430, 1431;* Ellis & Ev. Fungi Columb. *874, 1894, 2095;* Garrett, Fungi Utah. *122, 246;* D. Griff. W. Am. Fungi *84, 84a;* Sydow, Ured. *1902*.

21. **Pucciniola coördinata** Arthur.

Uromyces coördinatus Arth. Bull. Torrey Club **48**: 33. 1921.

O. Pycnia hypophyllous, scattered abundantly over surface of leaf, preceding and accompanying the aecia, pale- or honey-yellow, barely noticeable, globoid or flask-shaped, 100–140 μ broad; ostiolar filaments 50–75 μ long, protruding above surface of leaf.

I. Aecia hypophyllous, evenly scattered over surface of leaf, at first bullate and opening by a pore, 0.4–0.7 mm. across; peridia erect or slightly recurved, erose; peridial cells cuboidal or polygonal, 22–24 by 23–29 μ, abutted or slightly overlapping, the outer wall 10–12 μ thick, striate, the inner wall 3–5 μ thick, noticeably verrucose; aeciospores globoid or broadly ellipsoid, 15–19 by 19–24 μ; wall nearly or quite colorless, 1–2 μ thick, finely verrucose.

III. Telia hypophyllous, at first arising from and evenly filling the aecial cups, afterward independently but similarly grouped, the rutpured epidermis appearing like a peridium, somewhat pulverulent, dark chocolate-brown, 1–2 μ thick, sometimes with a small colorless papilla over the apical pore, closely and noticeably verrucose, inclined at times to be striate; pedicel fragile, colorless, largely deciduous.

ON EUPHORBIACEAE:
Tithymalus Palmeri (Engelm.) Arth. (*Euphorbia Palmeri* Engelm.), California.
TYPE LOCALITY: Big Bear Lake, California, on *Tithymalus Palmeri*.
DISTRIBUTION: Known only from the vicinity of the type locality.

22. **Pucciniola venusta** (Dietel & Holway) Arthur.

Uromyces venustus Dietel & Holway; Holway, Bot. Gaz. **31**: 326. 1901.

O. Pycnia not known.

I. Aecia hypophyllous, in small groups 1–2 mm. across or solitary, cupulate, 0.2–0.5 mm. across, 0.2 mm. high, deep-seated in the host-tissue, often opening only by a pore; peridium whitish, usually not projecting above the host-tissue; peridial cells narrowly rectangular in radial section, somewhat curved, 16–19 by 48–67 μ, abutted or slightly overlapping, the outer wall 3–4 μ thick, finely and closely verrucose, the inner wall 2–3 μ thick, finely and closely

verrucose; aeciospores broadly ellipsoid, 18–24 by 24–29 μ; wall colorless, thick, 2–3 μ, closely and finely verrucose.

III. Telia epiphyllous, scattered or circinating opposite the aecia, round or oblong, 0.2–1 mm. across, early naked, compact, becoming somewhat pulverulent, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or oblong, 19–23 by 23–39 μ, rostrate at apex, rounded below; wall dark chestnut- or chocolate-brown, yellowish or colorless in the beak, thick, 3–5 μ, thickened up to 7–12 μ at apex to form the beak, closely and finely verrucose in rather evident longitudinal lines; pedicel colorless, about length of spore, somewhat fragile.

ON SOLANACEAE:
Cestrum nitidum Mart. & Gal., Mexico (state).
TYPE LOCALITY: Amecameca, Mexico, on *Cestrum nitidum*.
DISTRIBUTION: Known only from the type locality.

23. **Pucciniola maculans** (Pat.) Arthur.

Uromyces Cestri maculans Pat. Bull. Soc. Myc. Fr. **28**: 140. 1912.
Uromyces maculans Arth. Mycologia **10**: 124. 1918.

O. Pycnia not seen.

I. Aecia mostly hypophyllous, scattered, single or loosely grouped in areas appearing dark on upper side of dried leaf, cupulate, 0.2–0.3 by 0.1 mm.; peridium yellowish-white, inconspicuous, usually covered by the epidermis; peridial cells rhomboidal or rhombic, 10–13 by 29–42 μ, overlapping, the outer wall colorless, about 2.5–3 μ thick, the inner wall colorless, about 2.5 μ thick, finely verrucose; aeciospores usually globoid, occasionally ellipsoid, 21–26 by 24–28 μ; wall colorless, varying in thickness, 1.5–3 μ, very finely and inconspicuously verrucose.

III. Telia epiphyllous, scattered, single or loosely grouped, round or oblong, 0.2–0.8 mm. across, early naked, pulvinate, dark chestnut- or chocolate-brown, surrounding epidermis inconspicuous; teliospores globoid or broadly ellipsoid, 19–23 by 24–29 μ, rounded or sometimes acute above, rounded or slightly narrowed below; wall chestnut-brown, 1.5–2.5 μ thick, thickened at apex, 4–8 μ, sometimes tipped with a light-yellow or colorless cuticle, appearing smooth when wet and finely verrucose, mostly in longitudinal lines when dry; pedicel colorless, of uniform diameter, fragile.

ON SOLANACEAE:
Cestrum lanatum Mart. & Gal., Guatemala.
Cestrum nocturnum L., Costa Rica.
TYPE LOCALITY: Near San José, Costa Rica, on *Cestrum* [*nocturnum*].
DISTRIBUTION: Central America.

24. **Pucciniola Cestri** (Mont.) Arthur.

Aecidium Cestri Mont. Ann. Sci. Nat. II. **3**: 356. 1835.
Uredo Cestri Bert.; Mont. Ann. Sci. Nat. II. **3**: 356. 1835.
Uromyces Cestri Lév. Ann. Sci. Nat. III. **8**: 371. 1847.
Caeomurus Cestri Kuntze, Rev. Gen. **3**^{3}: 449. 1898.
Uromycopsis Cestri Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia usually hypophyllous, rather loosely grouped or closely circinating in spots 2–10 mm. in diameter, cupulate or short-cylindric, 0.4–0.8 mm. in diameter, usually about 0.2 mm. in height, deeply seated in the mesophyll; peridium whitish, the margin erose, usually not projecting above the host-tissue; peridial cells irregularly and narrowly oblong or rhomboidal in radial section, 12–23 by 31–58 μ, overlapping, the outer wall 1.5–3 μ thick, finely and closely verrucose, the inner wall 2–5 μ thick, finely and closely verrucose; aeciospores angularly oblong, ellipsoid, or globoid, 19–26 by 25–37 μ; wall colorless or yellowish, 1.5–3 μ thick, closely and finely verrucose.

III. Telia usually epiphyllous, loosely grouped upon the spots with the aecia, round or oblong, 0.2–1.2 mm. across, early naked, compact, becoming slightly pulverulent, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid, oblong, or globoid, 19–26 by 25–35 μ, rounded or acute above, sometimes slightly narrowed below; wall chestnut-brown, sometimes with colorless thickening above, thick, 2.5–5 μ, thickened at apex, 4–8 μ, smooth or

occasionally closely and inconspicuously verrucose; pedicel colorless or light-yellow, once or twice length of spore.

ON SOLANACEAE:
Cestrum aurantiacum Lindl., Guatemala.
Cestrum laurifolium L'Hér., Porto Rico; St. John; Tortola.
Cestrum macrophyllum Vent., Porto Rico.
Cestrum pallidum Lam., Jamaica.
TYPE LOCALITY: Island of Juan Fernandez, Chile, on *Cestrum Pargui*.
DISTRIBUTION: West Indies and Central America; also in South America.

25. **Pucciniola Tweediana** (Speg.) Arthur.

Aecidium Tweedianum Speg. Anal. Soc. Ci. Argent. **10**: 11. 1880.
Aecidium Wittmackianum P. Henn. Bot. Jahrb. **17**: 17. 1893.
Uromyces induratus Sydow & Holway; Sydow, Ann. Myc. **1**: 16. 1903.
Uromycopsis indurata Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia unknown.

I. Aecia usually hypophyllous, loosely grouped or somewhat crowded upon light-colored spots 1–3 mm. across, sometimes causing a gall-like distention of the leaf, cupulate, 0.2–0.3 mm. in diameter, 0.1–0.2 mm. high; peridium whitish, the margin erose, not projecting much beyond the ruptured epidermis; peridial cells broadly rectangular or rhomboidal in radial section, 13–19 by 23–32 μ, the outer wall 5–7 μ thick, striate, the inner wall 2.5–3 μ thick, closely verrucose; aeciospores globoid or oblong, 13–17 by 16–21 μ; wall colorless, thin, 1 μ or less, very closely and inconspicuously verrucose.

III. Telia amphigenous or caulicolous, scattered or crowded in circinating groups about the aecia, round, 0.1–0.5 mm. across, tardily naked, chocolate-brown; stroma dividing the sorus into a number of chambers, chestnut-brown, 15–50 μ thick; teliospores fusiform-oblong or oblong, 13–16 by 29–34 μ, rounded or acute above, rounded or narrowed below; wall pale cinnamon-brown, thin, 1–2 μ, thickened at apex, 5–7 μ, smooth; pedicel colorless, once or twice length of spore.

ON ACANTHACEAE:
Dicliptera sp., Michoacan.
TYPE LOCALITY: Boca del Riachuelo, Argentina, on *Dicliptera Tweediana*.
DISTRIBUTION: Southern Mexico; also in South America and Africa.
EXSICCATI: Barth. N. Am. Ured. *1492*.

33. *ALLODUS Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Cycle of development includes pycnia, aecia and telia, usually with distinct alternating phases; autoecious. Pycnia and other sori subepidermal.

Pycnia deep-seated, usually globoid or flask-shaped, with ostiolar filaments.

Aecia erumpent, cupulate or cylindric, in some species of two sorts, primary and secondary; the primary aecia sometimes giving rise to secondary aecia unaccompanied by pycnia; the secondary aecia often followed by telia from the same mycelium. Peridium colorless, dehiscent by apical rupture, the margin more or less recurved. Aeciospores catenulate, globoid or ellipsoid; wall colorless or nearly so, verrucose.

Telia erumpent or long covered by the epidermis, arising independently, or else around or from within the secondary aecia. Teliospores free, pedicelled, two-celled, rarely accompanied by a few urediniospores; wall usually colored, firm, smooth or verrucosely sculptured.

Type species, *Puccinia Podophylli* Schw. (on *Podophyllum peltatum*).

Aecia and telia inhabiting monocotyledonous hosts.	
Host belonging to family Poaceae.	1. *A. graminella.*
Host belonging to family Calochortaceae.	2. *A. Calochorti.*
Host belonging to family Alliaceae.	
Teliospore-wall closely verrucose	2. *A. Calochorti.*
Teliospore-wall very coarsely and sparsely verrucose.	3. *A. Carnegiana.*
Teliospore-wall with a few longitudinal rows of verrucose markings.	4. *A. subangulata.*
Teliospore-wall smooth.	5. *A. Dichelostemmae.*
Aecia and telia inhabiting dicotyledonous hosts.	
Host belonging to family Portulacaceae.	6. *A. claytoniata.*
Host belonging to family Ranunculaceae.	
Teliospores 45–87 μ long, sometimes longitudinally ridged.	7. *A. gigantispora.*
Teliospores 32–50 μ long, not ridged.	8. *A. opposita.*

* *Allodus* in collaboration with CLAYTON ROBERTS ORTON.

Host belonging to family Berberidaceae.	9. *A. Podophylli.*
Host belonging to family Brassicaceae.	
Apex of teliospore-wall not thickened.	10. *A. arabicola.*
Apex of teliospore-wall thickened, 7–10 μ.	11. *A. consimilis.*
Host belonging to family Euphorbiaceae.	12. *A. intumescens.*
Host belonging to family Violaceae.	13. *A. effusa.*
Host belonging to family Onagraceae.	14. *A. Jussiaeae.*
Host belonging to family Ammiaceae.	
Teliospore-wall smooth.	
Teliospore-wall 3–5 μ thick.	15. *A. imperspicua.*
Teliospore-wall about 2 μ thick.	16. *A. microica.*
Teliospore-wall verrucose.	
Teliospore-wall 1.5–2 μ thick.	17. *A. Erigeniae.*
Teliospore-wall 2.5–3.5 μ thick.	18. *A. asperior.*
Teliospore-wall striately verrucose.	
Teliospore-wall 1.5–2.5 μ thick.	19. *A. Jonesii.*
Teliospore-wall 3–3.5 μ thick.	20. *A. Lindrothii.*
Host belonging to family Primulaceae.	21. *A. melanconioides.*
Host belonging to family Gentianaceae.	22. *A. Swertiae.*
Host belonging to family Convolvulaceae.	
Teliospore umbonate at apex.	
Umbo pale; aeciospores 16–24 μ × 19–30 μ.	
Aeciospore-wall 3–3.5 μ thick.	23. *A. opulenta.*
Aeciospore-wall 1–1.5 μ thick.	24. *A. crassipes.*
Umbo nearly concolorous; aeciospores large, 19–28 × 23–34 μ.	25. *A. megalospora.*
Teliospore rostrate at apex.	
Teliospore with rostrum 12–23 μ thick.	
Aeciospore-wall uniformly 1–1.5 μ thick.	26. *A. insignis.*
Aeciospore-wall 2–3 μ thick; apex much thicker 5–8 μ.	27. *A. nocticolor.*
Teliospore with rostrum 8–12 μ thick; aeciospore-wall 2–2.5 μ thick.	28. *A. superflua.*
Teliospore-wall usually of uniform thickness; aeciospore-wall 2.5–3 μ thick.	29. *A. rubicunda*
Host belonging to family Polemoniaceae.	
Teliospore-wall nearly uniform in thickness, finely verrucose.	30. *A. Giliae.*
Teliospore-wall thickened at apex, smooth.	
Teliospore-wall medium, thick, 1.5–2 μ at sides, 7–10 μ above.	31. *A. Douglasii.*
Teliospore wall thin, 1 μ at sides, 2–4 μ above.	32. *A. yosemitana.*
Host belonging to family Lamiaceae.	
Teliospore-wall smooth, pedicel normally placed.	33. *A. mellifera.*
Teliospore-wall verrucose, pedicel often attached near septum.	34. *A. vertisepta.*
Host belonging to family Solanaceae.	
Teliospore-wall about 2 μ thick.	35. *A. Chamaesarachae.*
Teliospore-wall 2.5–3 μ thick.	36. *A. Acnisti.*
Host belonging to family Scrophulariaceae.	
Teliospores minutely verrucose.	37. *A. complicata.*
Teliospores coarsely verrucose.	38. *A. rufescens.*
Host belonging to family Rubiaceae.	
Teliospore-wall 3–4 μ thick.	39. *A. scaberistipes.*
Teliospore-wall 1–1.5 μ thick.	40. *A. ambigua.*
Host belonging to family Valerianaceae.	41. *A. commutata.*
Host belonging to family Ambrosiaceae.	42. *A. intermixta.*
Host belonging to family Carduaceae.	
Teliospore conspicuously thickened at apex.	
Teliospore-wall smooth.	
Teliospores small, not more than 35 μ long.	43. *A. tenuis.*
Teliospores moderately long, 35–60 μ.	
Teliospore-wall 1 μ thick, apex 7–16 μ thick.	44. *A. Batesiana.*
Teliospore-wall 1.5–2 μ thick.	
Teliospore 7–12 μ thick at apex.	45. *A. gnaphaliata.*
Teliospore 5–8 μ thick at apex.	46. *A. Desmanthodii.*
Teliospores large, over 60 μ long.	47. *A. Ancizari.*
Teliospore-wall verrucose.	48. *A. cornuta.*
Teliospore not conspicuously thickened at apex.	49. *A. subcircinata.*

1. **Allodus graminella** (Speg.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Aecidium graminellum Speg. Anal. Soc. Ci. Argent. **12**: 77. 1881.
Puccinia graminella Dietel & Holway; Dietel, Erythea **3**: 80. 1895.

O. Pycnia unknown.

I. Aecia epiphyllous, scattered, often extending lineally along the veins of the leaf 4–5 mm., oval or oblong, short-cylindric, small, 0.2–0.5 mm. long, sometimes confluent; peridium colorless, the margin erose, usually erect; peridial cells rhomboidal in longitudinal section, 12–15 by 30–60 μ, the outer wall thick, 5–7 μ, transversely striate, the inner wall thin, 1.5–2 μ, very

finely verrucose; aeciospores globoid, slightly angular, 20–25 by 20–30 μ; wall colorless, thick, 3–4 μ, inconspicuously and closely verrucose.

III. Telia epiphyllous, scattered or crowded about the aecia, often lineally confluent along the veins, elongate, 0.7–2 mm. long, early naked, conspicuous, pulverulent, dark chocolate-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid, 22–28 by 35–55 μ, rounded or obtuse at both ends, slightly constricted at septum; wall dark chestnut-brown, about 3–3.5 μ thick, thicker at apex, 7–9 μ, smooth; pedicel colorless, rather stout, up to 100 μ long.

ON POACEAE:
Stipa lepida Hitchc., California.
Stipa lepida Andersoni (Vasey) Hitchc. (*S. eminens Andersoni* Vasey), California.
TYPE LOCALITY: Buenos Aires, Argentina, on *Stipa* sp.
DISTRIBUTION: One station at Berkeley, California, not seen since 1894; also in South America.
ILLUSTRATION: E. & P. Nat. Pfl. 1^{1**}: *f. 43.*
EXSICCATI: Arth. & Holway, Ured. Exs. Ic. *29a;* Ellis & Ev. Fungi Columb. *864;* Ellis & Ev. N. Am. Fungi *3350.*

2. **Allodus Calochorti** (Peck) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia Calochorti Peck, Bot. Gaz. **6**: 228. 1881.
Puccinia anachoreta Ellis & Hark. Bull. Calif. Acad. **1**: 14. 1884.
Puccinia Holwayi Dietel, Hedwigia **32**: 29. 1893.
Dicaeoma anachoreticum Kuntze, Rev. Gen. **3**^{3}: 467. 1898.
Dicaeoma Holwayi Kuntze, Rev. Gen. **3**^{3}: 469. 1898.

O. Pycnia chiefly epiphyllous, few in small open groups, punctiform, honey-yellow, rather conspicuous, in section irregularly globoid, 75–100 μ broad; ostiolar filaments prominent.

I. Aecia hypophyllous, in oval groups, 4–6 mm. long, cylindric, cupulate, short, 0.3–0.4 mm. across; peridium colorless, the margin irregularly lacerate, recurved; peridial cells rhomboidal, 10–20 by 26–30 μ, the outer wall transversely striate, 7–10 μ thick, smooth, the inner wall finely verrucose, 3–5 μ thick; aeciospores globoid, 16–23 by 19–26 μ; wall pale-yellow, 1.5–2 μ, evenly and finely verrucose.

III. Telia chiefly hypophyllous, gregarious at first, later scattered, oval, 0.5–2 mm. long, at first bullate, soon naked, pulverulent, dark chestnut-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid, 19–29 by 29–42 μ, rounded above and below, slightly or not constricted at septum; wall chestnut-brown, moderately thick, 1.5–2.5 μ, slightly thicker above, 3–5 μ, rather prominently verrucose above, smoother below; pedicel colorless or nearly so, rather delicate, half length of spore or less.

Urediniospores sometimes found in the telia, broadly ellipsoid, 21–26 by 26–31 μ; wall light golden-brown, moderately thick, 2–2.5 μ, finely and rather sparsely echinulate, the pores indistinct, 5 or 6, scattered.

ON ALLIACEAE:
Allium bisceptrum S. Wats., California.
ON CALOCHORTACEAE:
Calochortus albus Dougl., California.
Calochortus apiculatus Baker, Montana.
Calochortus elegans Pursh, Washington.
Calochortus euumbellatus A. Nelson, Idaho.
Calochortus flavus Schultes f., Mexico (state).
Calochortus Gunnisonii S. Wats., Colorado, Idaho, Nebraska, Wyoming.
Calochortus longebarbatus Dougl., Washington.
Calochortus macrocarpus Dougl., Oregon.
Calochortus Maweanus Leichtlin, California.
Calochortus nitidus Dougl., Oregon.
Calochortus nudus S. Wats., California.
Calochortus Nuttallii T. & G. (*C. Leichtlinii* Hook.), California, Colorado, Utah.
Calochortus Pringlei B. L. Robinson, Morelos.
Calochortus venustus Dougl., California.
Calochortus sp., Nevada.
TYPE LOCALITY: Utah, on *Calochortus Nuttallii.*
DISTRIBUTION: Nebraska to Washington, and southward into Mexico.
ILLUSTRATIONS: Holway, N. Am. Ured. 1: *pl. 9, f. 36a, b, c.*
EXSICCATI: Barth. N. Am. Ured. *127, 533, 622;* Clements, Crypt. Form. Colo. *549;* Ellis & Ev. Fungi Columb. *1953;* Garrett, Fungi Utah. *90.*

3. **Allodus Carnegiana** (Arth.) Orton, Mem. N. Y. Bot. Gard. **6**: 182. 1916.

Puccinia Carnegiana Arth. Bull. Torrey Club **42**: 587. 1915.

O. Pycnia amphigenous, in oval groups 1–2 mm. long, usually surrounded by or among the aecia, deep-seated and often erumpent, globoid, about 200 μ in diameter, honey-yellow; ostiolar filaments compact, about 35 μ long.

I. Aecia amphigenous, gregarious, in small roundish or oval groups 1–4 mm. long on brownish spots; peridium white, delicate, deeply lacerate, recurved, soon falling away, leaving the ruptured epidermis conspicuous; peridial cells terete or slightly rhomboidal in longitudinal section, 16–27 by 40–60 μ, the outer wall coarsely verrucose-striate, 4–5 μ thick, the inner wall 2–3 μ thick, rather sparsely and coarsely verrucose; aeciospores globoid, broadly ellipsoid or obovoid, 23–27 by 24–34 μ; wall colorless, 2–3 μ thick, finely verrucose.

III. Telia amphigenous, scattered or arising about or within the aecia, oval or oblong, rupturing by a longitudinal slit, rather tardily naked, blackish, slightly pulverulent; teliospores ellipsoid or oblong, 27–34 by 42–58 μ, very slightly or not constricted at septum, usually rounded at both ends, occasionally truncate above and narrowed below; wall blackish when mature, rather uniformly 2.5–3.5 μ thick, occasionally thickened 5 μ above, very coarsely and prominently verrucose; pedicel hyaline, fragile, up to length of spore.

Urediniospores occurring sparingly in the telia, broadly ellipsoid or obovoid, 27–35 by 32–42 μ; wall golden-yellow or cinnamon-brown, about 1.5 μ thick, finely and moderately verrucose-echinulate, the pores 12–15, scattered.

ON ALLIACEAE:
Dipterostemon pauciflorus (Torr.) Rydb. (*Brodiaea capitata pauciflora* Torr., *B. pauciflora* Standley), Arizona.
TYPE LOCALITY: Tucson, Arizona, on *Dipterostemon pauciflorus*.
DISTRIBUTION: Known only from the type locality.

4. **Allodus subangulata** (Holway) Orton, Mem. N. Y. Bot. Gard. **6**: 183. 1916.

Puccinia subangulata Holway, N. Am. Ured. 1: 25. 1905.

O. Pycnia amphigenous, crowded in small orbicular groups, honey-yellow, deep-seated in the tissues, depressed-globoid, 160–200 by 130 μ; ostiolar filaments rarely protruding above the epidermis.

I. Aecia amphigenous, gregarious, in orbicular or oval groups 1–5 mm. long, often encircling the pycnia, prominent, cylindric, about 0.5 mm. high; peridium colorless, erect, the margin finely erose or somewhat lacerate; peridial cells slightly rhomboidal in longitudinal section, 25–32 by 32–40 μ, the outer wall thick, 10–14 μ, conspicuously striate, the inner wall thinner, 6–8 μ, rather coarsely verrucose; aeciospores globoid, 18–23 by 24–33 μ; wall colorless, moderately thick, 2–2.5 μ, closely and distinctly verrucose.

III. Telia amphigenous, scattered, oblong, 1–3 mm. long, tardily naked, chestnut-brown, somewhat pulverulent, ruptured epidermis membranous, conspicuous; teliospores broadly ellipsoid, angular, 20–30 by 35–40 μ, cells often unequal in size and shape, rounded or oblique at both ends, very slightly constricted at septum; wall dark cinnamon-brown, of uniform thickness, 1.5–2 μ, finely rugose, with a few prominent irregular longitudinal ridges; pedicel hyaline, delicate, short, rarely as long as spore.

ON ALLIACEAE:
Hookera pulchella Salisb. (*Brodiaea congesta* Smith, *Dichelostemma congestum* Kunth), Washington.
TYPE LOCALITY: Washington, on *Brodiaea congesta*.
DISTRIBUTION: Northwestern United States.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 8, f. 34*.

5. **Allodus Dichelostemmae** (Dietel & Holway) Orton, Mem. N. Y. Bot. Gard. **6**: 183. 1916.

Puccinia Dichelostemmae Dietel & Holway; Dietel, Erythea **3**: 78. 1895.

O. Pycnia amphigenous, scattered or in small groups, punctiform, honey-yellow, globoid, 701-10 b 150 μ; ostiolar filaments 40–50 μ high.

I. Aecia amphigenous, often scattered over considerable portions of the leaves, short-cylindric, about 0.2 mm. high; peridium colorless, erect, lacerate; peridial cells squarish in longitudinal section, 18–29 by 26–35 μ, the outer wall 6–10 μ thick, inconspicuously striate, the inner wall 3–6 μ, rather coarsely verrucose; aeciospores globoid, 16–23 by 23–27 μ; wall colorless, about 2 μ thick, inconspicuously verrucose, tubercles appearing deciduous.

III. Telia amphigenous, scattered, oval or linear, 0.5–3 mm. long, tardily naked, chocolate- or blackish-brown, opening by a longitudinal slit; teliospores broadly ellipsoid, 35–51 by 43–61 μ, slightly or not constricted at septum, rounded at both ends, dark chocolate-brown, uniformly thick, 5–7 μ, smooth; pedicel colorless, usually deciduous, often laterally attached, rarely twice length of spore.

ON ALLIACEAE:
Hookera multiflora (Benth.) Britten (*Brodiaea multiflora* Benth.), California.
Hookera pulchella Salisb. (*Brodiaea congesta* Smith, *Dichelostemma congestum* Kunth), Oregon, Washington.
TYPE LOCALITY: Bingen, West Klickitat County, Washington, on *Dichelostemma congestum*.
DISTRIBUTION: Southern Washington to northern California.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 8, f. 33.*
EXSICCATI: Barth. N. Am. Ured. *139, 1541.*

6. **Allodus claytoniata** (Schw.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Caeoma (Aecidium) claytoniatum Schw. Trans. Am. Phil. Soc. II. **4**: 294. 1832.
Aecidium (Caeoma) claytoniatum Schw. Trans. Am. Phil. Soc. II. **4**. 309. 1832.
Puccinia Mariae-Wilsoni G. W. Clinton; Peck, Bull. Buffalo Soc. Nat. Sci. **1**: 66. 1873.
Dicaeoma claytoniatum Kuntze, Rev. Gen. 3^3: 466. 1898.
Puccinia claytoniata Peck, Bull. N. Y. State Mus. **6**: 226. 1899.

O. Pycnia amphigenous, in groups often over large areas, inconspicuous, honey-yellow, depressed-globoid or globoid, 128–160 μ in diameter, 110–140 μ high; ostiolar filaments up to 50 μ long.

I. Aecia amphigenous, regularly scattered, often over large areas, frequently covering entire leaf or petiole, short, cupulate, 0.6–0.8 mm. in diameter; peridium colorless, the margin erose; peridial cells squarish or rhomboidal, 18–26 by 23–29 μ, the outer wall 5–6 μ thick, transversely striate, the inner wall 3–3.5 μ thick, moderately verrucose-striate; aeciospores globoid, 13–21 by 18–23 μ; wall pale-yellow or colorless, 1–1.5 μ thick, very minutely verrucose.

III. Telia chiefly hypophyllous, scattered, sometimes confluent, small, roundish, 0.1–1 mm. in diameter, tardily naked, cinnamon-brown, pulvinate, pulverulent, ruptured epidermis rather conspicuous; teliospores elliptic or terete, sometimes angular, 18–27 by 30–48 μ, slightly constricted at septum, often narrowed at both ends; wall light cinnamon-brown, 1.5–2 μ thick, with a hyaline papilla over apex, up to 7 μ thick, evenly and finely verrucose; pedicel colorless, fragile, short.

ON PORTULACACEAE:
Claytonia caroliniana Michx., New Hampshire, New York, Vermont; Ontario.
Claytonia virginica L., Delaware, District of Columbia, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, Ohio, Pennsylvania, Vermont, Virginia, West Virginia, Wisconsin; Ontario, Quebec.
Limnia asarifolia (Bong.) Rydb. (*Claytonia asarifolia* Bong., *Montia asarifolia* Howell), Washington.
Limnia sibirica (L.) Haw. (*Claytonia sibirica* L., *Montia sibirica* Howell), Utah.
TYPE LOCALITY: New York, on *Claytonia virginica*.
DISTRIBUTION: New England to Delaware, and westward to the Pacific coast.
ILLUSTRATIONS: Holway, N. Am. Ured. 1: *pl. 14, f. 59.*
EXSICCATI: Barth. N. Am. Ured. *29, 133, 424, 425, 538, 833, 1804;* Ellis, N. Am. Fungi *1017, 1027;* Ellis & Ev. Fungi Columb. *180, 875;* Garrett, Fungi Utah. *67;* Kellerm. Ohio Fungi *12, 72;* Rab.-Wint. Fungi Eur. *2909;* Roum. Fungi Gall. *3414;* Seym. & Earle, Econ. Fungi Suppl. *B27;* Shear, N. Y. Fungi *73, 131;* Sydow, Ured. *323, 1315, 1316.*

7. **Allodus gigantispora** (Bubák) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia gigantispora Bubák, Sitz.-ber. Böhm. Ges. Wiss. **1901^2**: 9. 1901.

O. Pycnia amphigenous, in small groups on yellow spots 0.5–1 mm. across, surrounded by or opposite the aecia, erumpent, globoid, 60–120 μ in diameter by 55–100 μ high, honey-yellow; ostiolar filaments prominent, up to 60 μ long.

I. Aecia hypophyllous, occasionally caulicolous on yellowish or reddish spots, roundish or elongate on the veins, usually 1–4 mm. across, sometimes in diffused groups up to 10 mm. long; peridium white, cylindric, 0.5–1 mm. high, becoming deeply and conspicuously lacerate; peridial cells slightly rhombic or rhomboidal in longitudinal section, 18–23 by 26–34 μ, the outer wall 10–13 μ thick, finely striate,. the inner wall 3.5–5 μ thick, evenly verrucose-striate; aeciospores globoid, ellipsoid, or angular, 16–23 by 19–26 μ; wall colorless, about 1.5–2 μ thick, finely verrucose.

III. Telia amphigenous, gregarious, at first arising about or intermixed with the aecia, ater arising independently, small, at first appearing like minute dots, densely crowded together nto orbicular groups 0.5–4 mm. across, later becoming confluent and pulvinate, compact, long covered by the epidermis; teliospores cylindric or linear, obtuse or truncate above, narrowed to pedicel below, the lower cell often twice length of the upper, rarely subequal, 13–19 by 45–87 μ, slightly or considerably constricted at septum; wall 1–1.5 μ thick, smooth, often with one to three longitudinal ridges, 3–12 μ thick above, usually much darker; pedicel tinted, short.

ON RANUNCULACEAE:
Anemone cylindrica A. Gray, Colorado; Saskatchewan.
Anemone globosa Nutt. (*A. multifida globosa* Pritzel, *A. multifida* Brewer & Wats. not Poir.), Colorado, Idaho, Montana, Wyoming; Alberta, British Columbia.
Anemone narcissiflora L., Alaska.
TYPE LOCALITY: Livingston, Montana, on "*Anemone patens* var. *Nuttalliana*" error for *A. globosa*.
DISTRIBUTION: Saskatchewan to British Columbia, and southward to Colorado.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 2, f. 11*.
EXSICCATI: Barth. Fungi Columb. *4058*; Barth. N. Am. Ured. *632, 633*.

8. **Allodus opposita** Orton, Mem. N. Y. Bot. Gard. **6**: 185. 1916.

O. Pycnia amphigenous, in small groups, punctiform, globoid, 130–160 μ in diameter by 110–120 μ high, honey-yellow; ostiolar filaments 65–110 μ long, prominent.

I. Aecia hypophyllous, gregarious, on discolored spots 1–7 mm. across, short-cylindric, 0.2–0.3 mm. in diameter; peridium erect, erose; peridial cells squarish or rhomboidal, 16–23 by 24–30 μ, the outer wall 6–9 μ thick, conspicuously striate, the inner wall 4–5 μ thick, evenly verrucose; aeciospores angular or globoid, 14–19 by 18–26 μ; wall colorless, 1–1.5 μ thick, finely verrucose.

III. Telia chiefly epiphyllous, arising opposite the aecia, flat, spreading, 1–2 mm. across, very long covered by the epidermis; teliospores cylindric, 13–19 by 32–50 μ, truncate or narrowed above, gradually narrowed below, slightly constricted at septum; wall chestnut-brown, 1–1.5 μ thick, smooth, somewhat darker at apex, sometimes thickened to 7 μ above; pedicel golden, short.

ON RANUNCULACEAE:
Anemone globosa Nutt. (*A. multifida globosa* Pritzel, *A. multifida* Brewer & Wats. not Poir.), Colorado.
TYPE LOCALITY: Sulphur Springs, Colorado, on *Anemone globosa*.
DISTRIBUTION: Known only from the type locality.
EXSICCATI: Clements, Crypt. Form. Colo. *563*.

9. **Allodus Podophylli** (Schw.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Aecidium Podophylli Schw. Schr. Nat. Ges. Leipzig **1**: 66. 1822.
Puccinia Podophylli Schw. Schr. Nat. Ges. Leipzig **1**: 72. 1822.
Puccinia aculeata Link, in Willd. Sp. Pl. 6^2: 79. 1825.
Puccinia Podophylli Link, in Willd. Sp. Pl. 6^2 79. 1825.
Puccinia aurea Spreng. Syst. Veg. **4**: 568. 1827.
Caeoma (*Aecidium*) *podophyllatum* Schw. Trans. Am. Phil. Soc. II. **4**: 293. 1832.
Puccinia aculeata Schw. Trans. Am. Phil. Soc. II. **4**: 296. 1832.
Aecidium (*Caeoma*) *podophyllatum* Schw. Trans. Am. Phil. Soc. II. **4**: 309. 1832.
Dicaeoma Podophylli Kuntze, Rev. Gen. 3^3: 470. 1898.

O. Pycnia epiphyllous, sparsely gregarious, on yellowish spots opposite the aecia, deep-seated, depressed-globoid, 100–120 μ in diameter by 60–80 μ high, honey-yellow; ostiolar filaments up to 60 μ long.

I. Aecia chiefly hypophyllous, closely gregarious on yellowish spots over large areas,

cupulate; peridium short, the recurved margin soon becoming deeply lacerate and falling away, 0.2–0.3 mm. across; peridial cells rhomboidal or hemispheric in longitudinal section, 13–23 by 26–32 μ, the outer wall conspicuously striate, 4–5 μ thick, the inner wall rather sharply and prominently verrucose, 2–3 μ thick; aeciospores globoid, angular, or broadly ellipsoid, 18–24 by 19–29 μ; wall colorless, about 1 μ thick, minutely verrucose.

III. Telia amphigenous and caulicolous, small, round, 0.2–0.5 mm. in diameter, often becoming gregarious in more or less orbicular areas on yellowish spots 2–5 mm. across, sometimes arising in and about the aecia, tardily naked, pulverulent, chocolate-brown; teliospores clavate or elliptic, 19–26 by 40–55 μ, rarely constricted at septum, the upper cell rounded, the lower cell often narrowed to the pedicel; wall chestnut-brown, uniformly thick, 1.5–2 μ, sparingly beset with straight or slightly curved spines about 7 μ long; pedicel golden-yellow, fragile, rarely half length of spore.

ON BERBERIDACEAE:
Podophyllum peltatum L., Alabama, Arkansas, Delaware, District of Columbia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia, Wisconsin; Ontario.
TYPE LOCALITY: North Carolina, on *Podophyllum* [*peltatum*].
DISTRIBUTION: New York to Minnesota, and southward to the Gulf of Mexico.
ILLUSTRATIONS: Atti Acad. Lincei III. **2**: *pl. 9, f. 311a, b;* Bot. Gaz. **4**: *pl. 7, f. 7–17, 22;* Corda, Ic. Fung. **6**: *pl. 1, f. 13;* Holway, N. Am. Ured. **1**: *pl. 4, f. 21.*
EXSICCATI: Barth. Fungi Columb. *2267, 3365, 3462, 3566, 3858, 3960, 4158, 4272, 4760;* Barth. N. Am. Ured. *163, 256, 257, 463, 655, 959, 1068, 1166, 1225, 1806, 1807, 2105;* Ellis, N. Am. Fungi *257, 258;* Ellis & Ev. Fungi Columb. *182, 266;* Kellerm. Ohio Fungi *13, 55;* Rab.-Wint. Fungi Eur. *2911, 2912;* Rav. Fungi Am. *482, 729;* Roum. Fungi Gall. *2429;* Seym. & Earle, Econ. Fungi *253;* Shear, N. Y. Fungi *75;* Sydow, Ured. *76, 1318, 1378, 2127;* Thüm. Myc. Univ. *547, 626;* Vesterg. Micr. Rar. Sel. *783.*

10. **Allodus arabicola** (Ellis & Ev.) Arthur & Orton.

Puccinia arabicola Ellis & Ev. Jour. Myc. **6**: 119. 1891.

O. Pycnia chiefly epiphyllous, scattered or somewhat grouped on yellowish spots opposite the aecia, scarcely noticeable, golden-brown, globoid, 95–160 by 80–95 μ; ostiolar filaments compact, up to 65 μ long.

I. Aecia chiefly hypophyllous, numerous, gregarious on yellowish areas 2–5 mm. across, sometimes extending along the veins 5–7 mm., short, cupulate, 0.2–0.3 mm. in diameter; peridium yellowish, the margin erose; peridial cells rhomboidal or rhombic, 15–21 by 26–32 μ, the outer wall 4.5–5.5 μ thick, striate, the inner wall 3.5–4.5 μ thick, verrucose; aeciospores globoid, 16–19 by 19–21 μ; wall about 1 μ thick, colorless, finely and closely verrucose.

III. Telia amphigenous, most often rupturing on the upper surface, scattered, deep-seated, circular in outline, about 0.5 mm. across, pulvinate, somewhat plumbeous, tardily naked, not noticeably pulverulent, ruptured epidermis conspicuous; teliospores ellipsoid, 19–24 by 32–40 μ, usually rounded at both ends, sometimes narrowed below, slightly constricted at septum; wall uniformly 1.5–2.5 μ thick, smooth; pedicel colorless, fugacious, up to length of spore.

ON BRASSICACEAE:
Cardamine Douglasii (Torr.) Britton, Ontario.
TYPE LOCALITY: Ottawa, Canada, on "*Arabis* sp.", error for *Cardamine Douglasii.*
DISTRIBUTION: Known only from the type locality.

11. **Allodus consimilis** (Ellis & Ev.) Orton, Mem. N. Y. Bot. Gard. **6**: 187. 1916.

Puccinia consimilis Ellis & Ev. Jour. Myc. **6**: 120. 1891.
Dicaeoma consimile Kuntze, Rev. Gen. **3**^{3}: 468. 1898.

O. Pycnia chiefly hypophyllous, depressed-globoid, 80–125 μ in diameter by 50–65 μ high, honey-yellow; ostiolar filaments prominent, up to 50 μ long.

I. Aecia hypophyllous, distributed rather unevenly over the leaves, short-cylindric, 0.3–0.4 mm. in diameter; peridium nearly colorless, cupulate, the margin recurved and erose; peridial cells rhomboidal or oblong, 16–20 by 31–37 μ, the outer wall 6–9 μ thick, striate, the inner wall 3–4 μ thick, rather coarsely verrucose; aeciospores globoid or broadly ellipsoid, 16–20 by 20–28 μ; wall colorless, 1.5 μ thick, very minutely verrucose, appearing smooth when wet.

III. Telia hypophyllous, scattered rather unevenly among the aecia, or arising from within the aecia, circular, 0.3–0.4 mm. in diameter, pulvinate, not pulverulent, rather early naked, ruptured epidermis conspicuous; teliospores ellipsoid, 16–22 by 31–37 μ, usually rounded above, rounded or narrowed below, noticeably constricted at septum; wall cinnamon-brown, 1.5–2 μ thick, smooth, 7–10 μ thick above; pedicel golden- or light cinnamon-brown, delicate, rarely up to 100 μ long.

ON BRASSICACEAE:
Schoenocrambe linifolia (Nutt.) Greene (*Sisymbrium linifolium* Nutt.), Montana.
TYPE LOCALITY: Helena, Montana, on *Sisymbrium linifolium*.
DISTRIBUTION: Known only from the type locality.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 17, f. 63i.*

12. **Allodus intumescens** (Sydow) Arthur & Orton.

Puccinia Euphorbiae intumescens Sydow, Monog. Ured. 1: 457. 1904.
Puccinia intumescens Holway, N. Am. Ured. 1: 60. 1907.

O. Pycnia amphigenous, in scattered groups on discolored areas with aecia and telia, 1–3 mm. across, conspicuous, light-brown, flattened-globoid, 96–115 by 61–100 μ; ostiolar filaments sometimes agglutinated, 48–80 μ long; pycniospores colorless, oval, 1.5 by 3–4 μ.

I. Aecia hypophyllous, gregarious, crowded in irregular groups 1–3 mm. across, low, 0.3–0.4 mm. in diameter; peridium slightly yellowish, the margin becoming lacerate, recurved; peridial cells rectangular in longitudinal section, 9–16 by 18–51 μ, abutted, the outer wall thick, 6–12 μ, transversely striate, the inner wall thin, 1.5–2 μ, verrucose; aeciospores ellipsoid, 16–23 by 24–35 μ; wall colorless, moderately thin, 1.5–2.5 μ, rather strongly and moderately echinulate with broad conic echinulations.

III. Telia chiefly epiphyllous, scattered, indefinite, 0.5–2 mm. or more across, early naked, slightly pulverulent, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or oblong-ellipsoid, 26–33 by 55–71 μ, usually rounded below, usually narrowed and shortly rostriform above, not or only slightly constricted at septum; wall dark chestnut-brown, medium-thick, 2.5–4 μ, paler above, 9–16 μ, rather closely and strongly verrucose; pedicel colorless except close to spore, once to once and half length of spore, fusiform or inverted napiform, 13–16 μ at broadest diameter.

ON EUPHORBIACEAE:
Adenorima calyculata (H.B.K.) Millsp. (*Euphorbia calyculata* H.B.K.), Michoacan.
TYPE LOCALITY: Lake Patzcuaro, Michoacan, on *Euphorbia calyculata*.
DISTRIBUTION: Michoacan.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 25, f. 90.*
EXSICCATI: Barth. N. Am. Ured. *1441;* Barth. Fungi Columb. *4959.*

13. **Allodus effusa** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia effusa Dietel & Holway; Dietel, Erythea 3: 81. 1895.

O. Pycnia amphigenous, scattered or in groups among the aecia, inconspicuous, globoid or pyriform, 130–200 μ in diameter, honey-yellow; ostiolar filaments short.

I. Aecia amphigenous, in rather loose groups, often scattered over considerable portions of the leaf or along the petioles, more rarely annular, circular, 0.3–0.5 mm. across, cupulate; peridium white, short, recurved, the margin erose; peridial cells rhomboidal in longitudinal section, 18–24 by 27–34 μ, the outer wall finely and inconspicuously striate, 7–9 μ thick, the inner wall evenly verrucose, 3–5 μ thick; aeciospores globoid or broadly ellipsoid, 16–23 by 19–30 μ; wall colorless, 1–1.5 μ thick, very inconspicuously verrucose.

III. Telia amphigenous, chiefly arising in or around the aecia, early naked, dark chocolate-brown, somewhat pulverulent; teliospores broadly ellipsoid or oblong, 20–30 by 32–51 μ, usually rounded at both ends, slightly or not constricted at septum; wall chestnut- or light chocolate-brown, 2.5–3 μ thick, moderately verrucose above, nearly smooth below, rarely thickened to 5 μ above; pedicel colorless, fragile, rarely length of spore.

Urediniospores occur sparingly in the telia, globoid or obovoid, golden-yellow, 21–26 by 27–35 μ, moderately or sparsely echinulate; wall 3–3.5 μ thick; the pores 2, opposite, equatorial or nearly so.

ON VIOLACEAE:
Viola lobata Benth., California.
Viola praemorsa Dougl., Washington.
TYPE LOCALITY: Dunsmuir, California, on *Viola lobata*.
DISTRIBUTION: Northern California and northward.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 30, f. 104a, b.*
EXSICCATI: Barth. N. Am. Ured. *1438;* Sydow, Ured. *2371.*

14. **Allodus Jussiaeae** (Speg.) Arthur & Orton.

Aecidium Jussiaeae Speg. Anal. Soc. Ci. Argent. 9: 174. 1880.
Puccinia Jussiaeae Speg. Anal. Soc. Ci. Argent. 12: 68. 1881.
Aecidium Ludwigiae Ellis & Ev. Proc. Acad. Phila. 1893: 155. 1893.
Aecidium Isnardiae Lagerh. Tromsö Mus. Aarsh. 17: 102. 1895.
Puccinia Nesaeae Ellis & Ev. Bull. Torrey Club 22: 363, excl. synonymy. 1895. Not *Aecidium Nesaeae* W. Gerard, 1873.
Dicaeoma Jussiaeae Kuntze, Rev. Gen. 3³: 469. 1898.
Dicaeoma Nesaeae Kuntze, Rev. Gen. 3³: 469. 1898.
Allodus Nesaeae Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.
Puccinia Ludwigiae Holway, N. Am. Ured. 1: 72. 1907. Not *P. Ludwigiae* Tepper, 1890.
Allodus Ludwigiae Orton, Mem. N. Y. Bot. Gard. 6: 189. 1916.

O. Pycnia epiphyllous, in groups on reddish spots opposite the aecia, inconspicuous, immersed, globoid, chestnut-brown, 80–120 μ in diameter; ostiolar filaments not seen.

I. Aecia hypophyllous, in dense groups, often raised, rarely annular, on reddish spots, small, circular, 0.2–0.3 mm. across, cupulate; peridium white, short-cylindric, the margin erose, slightly or not recurved; peridial cells rhomboidal, 18–26 by 30–38 μ in longitudinal section, the outer wall finely verrucose-striate, 4–5 μ thick, the inner wall rather coarsely verrucose, 3–4 μ thick; aeciospores globoid, angular, 13–19 by 15–21 μ; wall colorless or light-yellow, 1–1.5 μ thick, very minutely verrucose, appearing smooth when wet.

III. Telia chiefly hypophyllous, inconspicuous, arising at first in and later around the aecia, uncovered, compact, dark cinnamon-brown; teliospores oblong, cylindric, or terete, 15–21 by 35–58 μ, rounded or obtuse above, usually narrowed below, moderately constricted at septum; wall cinnamon-brown, 1.5–2 μ thick, smooth, thickened 7–12 μ above, slightly paler; pedicel slightly tinted, sometimes as long as spore.

ON ONAGRACEAE:
Isnardia palustris L. (*Ludwigia palustris* Ell.), Florida, Louisiana, Ohio, Texas.
Isnardia repens (Sw.) DC. (*Ludwigia natans* Ell.), California; Cuba.
Ludwigia alternifolia L., Florida.
Ludwigia glandulosa Walt. (*L. cylindrica* Ell.), Maryland.
Ludwigia hirtella Raf., Mississippi.
Ludwigia polycarpa Short & Peter, Iowa, Missouri.
Ludwigia sphaerocarpa Ell., Delaware, Florida.
Ludwigia virgata Michx., Florida.
TYPE LOCALITY: Rio de la Plata, Argentina, on *Jussiaea longifolia.*
DISTRIBUTION: Delaware to Iowa, and southward to Louisiana and Florida; also in South America.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 32, f. 109.*

15. **Allodus imperspicua** (Sydow) Orton, Mem. N. Y. Bot. Gard. 6: 189. 1916.

Puccinia imperspicua Sydow, Monog. Ured. 1: 361. 1902.

O. Pycnia seen caulicolous only, gregarious, scattered among the aecia in groups 1–5 mm. long, flattened laterally, turning dark cinnamon-brown with age, 60–115 μ in diameter by 115–130 μ high; ostiolar filaments up to 70 μ long.

I. Aecia seen caulicolous only, gregarious, in oblong groups 1–5 mm. long, cupulate or short-cylindric, 0.5–0.7 mm. in diameter; peridium not seen; peridial cells rhomboidal in longitudinal section, 16–21 by 32–40 μ, the outer wall 3–5 μ thick, rather prominently striate, the inner wall 5–7 μ thick, evenly striate-verrucose; aeciospores globoid or broadly ellipsoid, 19–23 by 21–27 μ; wall nearly colorless, 1 μ thick, finely verrucose.

III. Telia amphigenous or caulicolous, scattered or occasionally confluent, roundish, 0.2–0.8 mm. across, early naked, pulvinate, pulverulent, chocolate-brown or blackish; teliospores broadly ellipsoid, 24–34 by 34–51 μ, usually rounded at both ends, sometimes narrowed below; wall light chocolate-brown, 3–5 μ thick, 7–10 μ thick above, smooth; pedicel colorless, stout, rather persistent, about twice length of spore.

ON AMMIACEAE:
Arracacia multifida S. Wats., Hidalgo, Mexico (state).
TYPE LOCALITY: Rio Hondo, Mexico, on *Arracacia multifida*.
DISTRIBUTION: South-central Mexico.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 39, f. 128.*
EXSICCATI: Barth. N. Am. Ured. *1903;* Ellis & Ev. Fungi Columb. *2060.*

16. **Allodus microica** (Ellis) Orton, Mem. N. Y. Bot. Gard. **6**: 192. 1916.

Puccinia microica Ellis, Jour. Myc. **7**: 274. 1893.
Dicaeoma microicum Kuntze, Rev. Gen. **3**[3]: 469. 1898.

O. Pycnia not seen.

I. Aecia hypophyllous, gregarious, in roundish or oval groups 1–3 mm. across, cylindric, 0.2–0.3 mm. in diameter; peridium colorless, the margin lacerate, recurved; peridial cells rhomboidal in longitudinal section, 15–18 by 27–29 μ, the outer wall 7–9 μ, finely striate, the inner wall 3–4 μ, conspicuously verrucose; aeciospores globoid or angular, 14–19 μ in diameter; wall colorless, 1–1.5 μ thick, minutely verrucose.

III. Telia chiefly hypophyllous or caulicolous, crowded, first formed in and about the aecia, bullate, 0.2–0.3 mm. in diameter, later arising independently and dehiscing by a central pore, frequently in circular groups 1–4 mm. across, in larger groups when caulicolous, pulverulent when mature, cinnamon-brown; teliospores usually terete, narrowed at both ends, 13–19 by 27–42 μ, very slightly constricted at septum; wall cinnamon-brown, smooth, about 2 μ thick, with hyaline papilla, 5–7 μ thick above; pedicel colorless, fragile, rarely as long as spore.

ON AMMIACEAE:
Deringa canadensis (L.) Kuntze (*Cryptotaenia canadensis* DC.), District of Columbia, Iowa, Maryland.
TYPE LOCALITY: Garrett Park, Maryland, on "*Sanicula?*," error for *Deringa canadensis*.
DISTRIBUTION: Locally in northern Iowa and on the Potomac river.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 39, f. 131.*

17. **Allodus Erigeniae** Orton, Mem. N. Y. Bot. Gard. **6**: 191. 1916.

O. Pycnia amphigenous, caulicolous, among the aecia in groups 0.5–1 mm. across, low-conoidal, 100–130 μ in diameter by 45–65 μ high; ostiolar filaments compact, up to 35 μ long.

I. Aecia amphigenous, caulicolous, gregarious or scattered, in irregular groups on leaves and stems rarely up to 5 mm. long, cupulate or short-cylindric, 0.2–0.4 mm. in diameter; peridium colorless, the margin incurved; peridial cells rhomboidal in longitudinal section, 21–23 by 29–45 μ, the outer wall very finely striate, 5–7 μ thick, the inner wall evenly and prominently fimbriate-verrucose, 5–7 μ thick; aeciospores globoid or broadly ellipsoid, 16–21 by 19–26 μ; wall colorless, 1–1.5 μ thick, finely verrucose.

III. Telia chiefly hypophyllous, caulicolous, scattered, roundish or oval, 0.3–1 mm. long, rather early naked, ruptured epidermis conspicuous, pulverulent, dark cinnamon-brown; teliospores broadly ellipsoid or oblong, 20–24 by 29–39 μ, slightly constricted at septum, usually rounded at both ends; wall cinnamon-brown, uniformly 1.5–2 μ thick, finely and inconspicuously verrucose; pedicel colorless, short, fragile.

ON AMMIACEAE:
Erigenia bulbosa (Michx.) Nutt., Ohio; Ontario.
TYPE LOCALITY: London, Ontario, on *Erigenia bulbosa*.
DISTRIBUTION: Region adjoining north and south shore of Lake Erie.
ILLUSTRATION: Holway, N. Am. Ured. 1: *pl. 38, f. 125c.*
EXSICCATI: Ellis, N. Am. Fungi *1040b.*

18. **Allodus asperior** (Ellis & Ev.) Orton, Mem. N. Y. Bot. Gard. **6**: 193. 1916.

Puccinia asperior Ellis & Ev. Bull. Washburn Lab. Nat. Hist. **1**: 3. 1884.
Dicaeoma asperius Kuntze, Rev. Gen. **3**[3]: 468. 1898.
Puccinia oregonensis Farle, Bull. N. Y. Bot. Gard. **2**: 349. 1902.
Allodus oregonensis Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia chiefly epiphyllous and caulicolous, gregarious, in small groups 1–2 mm. across on leaves, on stems in larger groups, sometimes 15 mm. long, flattened, honey-yellow, 100–145 μ in diameter by 65–80 μ high; ostiolar filaments 25–30 μ long.

I. Aecia hypophyllous, caulicolous, gregarious, usually in large groups often covering the entire surface of leaflets and considerable portions of the stems and petioles on discolored spots 1–15 mm. long, cupulate or short-cylindric, 0.3–0.6 mm. in diameter; peridium colorless, the margin slightly erose and recurved; peridial cells rhomboidal in longitudinal section, 21–26 by 27–40 μ, the outer wall thick, 10–13 μ, striate only near the lumen, the inner wall thinner, 6–8 μ, fimbriate-verrucose; aeciospores globoid or ellipsoid, 18–22 by 20–29 μ; wall colorless, 1.5–2 μ thick, finely verrucose.

III. Telia hypophyllous or caulicolous, scattered or in small groups, often confluent, roundish or oblong, 0.2–1.5 mm. long, rather long covered by the epidermis, pulverulent, chocolate-brown; teliospores broadly ellipsoid or oblong, 21–26 by 29–40 μ, usually rounded at both ends; wall chestnut-brown, 2.5–3.5 μ thick, rarely thickened up to 5 μ above, coarsely and sparsely verrucose; pedicel colorless, usually deciduous, rarely as long as spore.

ON AMMIACEAE:
Leptotaenia dissecta Nutt. (*Ferula dissoluta* S. Wats.), California, Oregon, Washington.
TYPE LOCALITY: Klickitat County, Washington, on *Ferula dissoluta*.
DISTRIBUTION: Central California to southern Washington.
ILLUSTRATIONS: Holway, N. Am. Ured. **1**: *pl. 43, f. 140a, b.*
EXSICCATI: Barth. N. Am. Ured. *1219*.

19. **Allodus Jonesii** (Peck) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia Jonesii Peck, Bot. Gaz. **6**: 226. 1881.
Puccinia Cymopteri Dietel & Holway; Dietel, Bot. Gaz. **18**: 255. 1893.
Dicaeoma Cymopteri Kuntze, Rev. Gen. **3**^{3}: 468. 1898.
Dicaeoma Jonesii Kuntze, Rev. Gen. **3**^{3}: 469. 1898.
Aecidium Leptotaeniae Lindr. Medd. Stockh. Högsk. Bot. Inst. **4**^{9}: 8. 1901.
Puccinia Traversiana Sydow, Monog. Ured. **1**: 889. 1904.
Allodus Cymopteri Barth. N. Am. Ured. *2002*. 1918.

O. Pycnia amphigenous, caulicolous, gregarious, in roundish or oblong groups 1–5 mm. long, surrounded by or intermixed with the aecia, occasionally more or less encircling the aecia, erumpent, globoid or conoidal, 70–120 μ in diameter by 50–110 μ high; ostiolar filaments up to 65 μ long.

I. Aecia chiefly hypophyllous and caulicolous, gregarious, on roundish or oblong yellowish spots 1–3 mm. long, short-cylindric, 0.2–0.5 mm. in diameter; peridium colorless, the margin erose and recurved when mature; peridial cells rhomboidal in longitudinal section, 19–26 by 27–37 μ, the outer wall 7–12 μ, striate only near the lumen, the inner wall 5–7 μ thick, rather coarsely and deeply lacerate-verrucose; aeciospores globoid or broadly ellipsoid, 16–23 by 18–26 μ; wall colorless or light-yellow, 1–1.5 μ thick, finely verrucose.

III. Telia amphigenous and caulicolous, scattered when foliicolous, often confluent along the stem, usually 0.3–2.5 mm. across, tardily naked, cinereous, pulverulent, chocolate-brown or blackish; teliospores broadly ellipsoid or oblong, 18–24 by 29–43 μ, slightly constricted at septum, usually rounded at both ends; wall dark cinnamon- or chestnut-brown, 1.5–2.5 μ thick, usually uniform, varying from very minutely punctate to conspicuously verrucose, the tubercles more or less arranged in longitudinal striations; pedicel colorless, deciduous, fragile, rarely as long as spore.

ON AMMIACEAE:
Cogswellia angustata Coult. & Rose, Oregon.
Cogswellia daucifolia (Nutt.) M. E. Jones (*Peucedanum daucifolium* Nutt.), Kansas.
Cogswellia foeniculacea (Nutt.) Coult. & Rose (*Peucedanum foeniculaceum* Nutt., *Lomatium foeniculaceum* Coult. & Rose), Kansas, Nebraska.
Cogswellia Grayi Coult. & Rose (*Peucedanum Grayi* Coult. & Rose, *Lomatium Grayi* Coult. & Rose), Utah.
Cogswellia lapidosa (M. E. Jones) Rydb. (*Cymopterus lapidosus* M. E. Jones), Utah.
Cogswellia macrocarpa (Nutt.) M. E. Jones (*Peucedanum macrocarpum* Nutt., *Lomatium macrocarpum* Coult. & Rose), Montana, Nevada, Washington.
Cogswellia montana M. E. Jones (*Lomatium purpureum* A. Nelson), Montana.
Cogswellia nevadensis (S. Wats.) M. E. Jones (*Peucedanum nevadense* S. Wats.), Nevada.
Cogswellia orientalis (Coult. & Rose) M. E. Jones (*Peucedanum nudicaule* Nutt., *Lomatium orientale* Coult. & Rose), Arizona, Colorado, Nebraska, Oklahoma.
Cogswellia platycarpa (Torr.) M. E. Jones (*Peucedanum simplex* Nutt., *Lomatium platycarpum* Coult. & Rose), California, Utah.
Cogswellia Suksdorfii (S. Wats.) M. E. Jones (*Peucedanum Suksdorfii* S. Wats., *Lomatium Suksdorfii* Coult. & Rose), Washington.

Cogswellia triternata (Pursh) M. E. Jones (*Peucedanum triternatum* Nutt., *Lomatium triternatum* Coult. & Rose), Oregon, Washington.
Cogswellia villosa (Raf.) Schultes (*Peucedanum villosum* Nutt.), Montana.
Coriophyllus Betheli (Osterhout) Rydb. (*Aulospermum Betheli* Osterhout), Colorado.
Coriophyllus purpureus (S. Wats.) Rydb. (*Aulospermum purpureum* Coult. & Rose, *Cymopterus purpureus* S. Wats.), Colorado.
Cymopterus acaulis (Pursh) Rydb., Colorado, Nebraska.
Cymopterus Fendleri A. Gray, Utah.
Cynomarathrum Parryi (S. Wats.) Coult. & Rose, California.
Eurypteria lucida Nutt., California.
Leptotaenia Eatonii Coult. & Rose, Colorado.
Leptotaenia multifida Nutt. (*Ferula multifida* A. Gray), Colorado, Idaho, Montana, Utah, Washington; Alberta.
Leptotaenia purpurea (S. Wats.) Coult. & Rose (*Ferula purpurea* S. Wats.), Washington.
Musineon divaricatum (Pursh) Coult. & Rose, Colorado, Montana, South Dakota.
Musineon Hookeri (T. & G.) Nutt. (*M. trachyspermum* Nutt.), Colorado.
Phellopterus montanus Nutt. (*Cymopterus montanus* T. & G.), Colorado, New Mexico.
Pteryxia calcarea (M. E. Jones) Coult. & Rose (*Cymopterus calcarea* M. E. Jones), Wyoming.
Pteryxia terebinthina (Hook.) Coult. & Rose (*Cymopterus terebinthinus* T. & G.), California.

TYPE LOCALITY: Utah, on *Ferula multifida*.
DISTRIBUTION: Alberta southward to California and eastward to Kansas and Nebraska.
ILLUSTRATIONS: Holway, N. Am. Ured. 1: *pl. 42, f. 137a, b, c; pl. 44, f. 141a, b, c.*
EXSICCATI: Barth. N. Am. Ured. *1055, 1056, 1146, 1236, 1556, 1702, 1703, 1905, 1906, 2002, 2003;* Carleton, Ured. Am. *3;* Clements, Crypt. Form. Colo. *567;* Ellis, N. Am. Fungi *1448;* Ellis & Ev. Fungi Columb. *1298, 1460, 1966, 1967, 2063;* Ellis & Ev. N. Am. Fungi *1856, 3581;* Garrett, Fungi Utah. *5, 6, 7, 8;* Sydow, Ured. *824, 1929, 1930.*

20. **Allodus Lindrothii** (Sydow) Orton, Mem. N. Y. Bot. Gard. **6**: 192. 1916.

Puccinia Lindrothii Sydow; Lindr. Acta Soc. Faun. Fl. Fenn. **22**[1]: 62. 1902.
Puccinia sphalerocondra Lindr. Acta Soc. Faun. Fl. Fenn. **22**[1]: 63. 1902.

O. Pycnia amphigenous, caulicolous, gregarious, usually in groups 0.5–4 mm. across, surrounded by the aecia, erumpent and globoid when hypophyllous, deep-seated and flattened when epiphyllous, honey-yellow, 120–145 μ in diameter by 80–120 μ high; ostiolar filaments not observed.

I. Aecia chiefly hypophyllous, caulicolous, gregarious, in roundish or oblong groups 2–15 mm. long, short-cylindric, 0.3–0.5 mm. in diameter; peridium colorless, the margin slightly erose, usually incurved; peridial cells slightly rhomboidal in longitudinal section, 19–23 by 29–32 μ, the outer wall 7–10 μ thick, striate only near the lumen, the inner wall 7–9 μ thick, rather coarsely and deeply fimbriate-verrucose; aeciospores globoid or ellipsoid, 18–24 by 23–32 μ; wall light-yellowish, 1.5–2 μ thick, finely verrucose.

III. Telia chiefly hypophyllous, caulicolous, scattered, rarely confluent, roundish or oblong when caulicolous, 0.4–1.2 mm. long, rather early naked, ruptured epidermis conspicuous, pulverulent, dark chocolate-brown; teliospores broadly ellipsoid or oblong, 18–26 by 29–42 μ, not or slightly constricted at septum, usually rounded at both ends; wall chestnut- or light chocolate-brown, 3–3.5 μ thick, rarely thickened up to 5 μ above, evenly covered with longitudinal rows of small verrucose markings; pedicel colorless, deciduous, rarely as long as spore.

ON AMMIACEAE:
Drudeophytum Hartwegii (A. Gray) Coult. & Rose (*Velaea Hartwegii* Coult. & Rose, *Arracacia Hartwegii* S. Wats.), California.
Eurypteria Hassei Coult. & Rose. (*Peucedanum Hassei* Coult. & Rose), California.
Velaea arguta (T. & G.) Coult. & Rose (*Deweya arguta* T. & G.), California.

TYPE LOCALITY: Berkeley, California, on *Arracacia Hartwegii*.
DISTRIBUTION: Known only from central California.
ILLUSTRATIONS: Holway, N. Am. Ured. 1: *pl. 38, f. 127a; pl. 39, f. 127b.*
EXSICCATI: Barth. N. Am. Ured. *349, 1256;* Ellis & Ev. Fungi Columb. *51, 343;* Rab.-Wint.-Paz. Fungi Eur. *4022;* Sydow, Ured. *877, 878.*

21. **Allodus melanconioides** (Ellis & Hark.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia melanconioides Ellis & Hark. Bull. Calif. Acad. 1: 27. 1884.
Dicaeoma melanconioides Kuntze, Rev. Gen. **3**[3]: 469. 1898.

O. Pycnia amphigenous, rather conspicuous, in loose groups 0.5–5 mm. across, surrounded by the aecia, globoid, 90–150 μ in diameter by 130–140 μ high, honey-yellow; ostiolar filaments up to 60 μ long.

I. Aecia chiefly hypophyllous, gregarious on yellow spots, roundish or oval in outline, or elongate when on the veins and petioles, 1–10 mm. across, short, cupulate, 0.2–0.3 mm. in diameter; peridium yellowish, erose; peridial cells rhombic, 19–23 by 32–38 μ, the outer wall finely striate, 6–8 μ thick, the inner wall verrucose, 2.5–3 μ thick; aeciospores globoid, 15–19 by 22–26 μ; wall colorless, 1–1.5 μ thick, very closely and finely verrucose.

III. Telia amphigenous, scattered, round, small, 0.2–1 mm. across, tardily naked, dark chestnut-brown or cinerous when covered, slightly pulverulent; teliospores broadly ellipsoid, 20–28 by 30–48 μ, usually rounded at both ends, slightly or not constricted at septum; wall chestnut-brown, uniformly 2–2.5 μ thick, smooth; pedicel deciduous, colorless.

ON PRIMULACEAE:
Dodecatheon cruciatum Greene, California.
Dodecatheon latifolium (Hook.) Piper (*D. Hendersonii* A. Gray), California, Oregon.
TYPE LOCALITY: Antioch, California, on "*Dodecatheon Meadia*," error for *D. latifolium*.
DISTRIBUTION: Pacific slope of the United States.
EXSICCATI: Barth. N. Am. Ured. *155;* Ellis, N. Am. Fungi *1059*.

22. **Allodus Swertiae** (Winter) Orton, Mem. N. Y. Bot. Gard. **6**: 195. 1916.

Aecidium Swertiae Opiz, Seznam 111, hyponym. 1852.
Puccinia Swertiae Winter, in Rab. Krypt.-Fl. **1**: 205. 1881.
Dicaeoma Swertiae Kuntze, Rev. Gen. 3^3: 470. 1898.

O. Pycnia amphigenous, not conspicuous, gregarious, in circular or elongated groups 1–5 mm. across, surrounded by the aecia, globoid, 100–130 μ in diameter, 100–120 μ high; ostiolar filaments short, rarely protruding above the epidermis.

I. Aecia chiefly hypophyllous, gregarious, on yellow spots, roundish or oval in outline, 1.5–4 mm. across, short, cupulate, 0.25–0.3 mm. in diameter; peridium whitish, erose; peridial cells rhomboidal, 20–27 by 26–40 μ, the outer wall finely striate, 7–10 μ thick, the inner wall rather conspicuously verrucose, 3–5 μ thick; aeciospores globoid, 16–23 by 21–27 μ; wall colorless, 1–1.5 μ thick, very finely verrucose.

III. Telia amphigenous, scattered or in annular groups, sometimes becoming confluent, 0.3–1 mm. across, rather early naked, chestnut-brown, flattish, pulverulent, ruptured epidermis conspicuous; teliospores ellipsoid, 20–27 by 33–43 μ, usually rounded at both ends, slightly or not constricted at septum; wall dark cinnamon-brown, about 2 μ thick, uniform or rarely thickened to 3 μ above, smooth; pedicel short, colorless, fragile.

ON GENTIANACEAE:
Swertia Fritillaria Rydb., Utah.
Swertia ovalifolia Greene, Idaho.
Swertia perennis L., Alaska.
Swertia scopulina Greene, Colorado.
TYPE LOCALITY: Bohemia, on *Swertia perennis*.
DISTRIBUTION: Rocky Mountain region; also in Europe.
ILLUSTRATIONS: Beitr. Krypt. Schweiz 2^2: *f. 129*.
EXSICCATI: Clements, Crypt. Form. Colo. *144;* Garrett. Fungi Utah. *241*.

23. **Allodus opulenta** (Speg.) Orton, Mem. N. Y. Bot. Gard. **6**: 195. 1916.

Puccinia opulenta Speg. Anal. Soc. Ci. Argent. **9**: 170. 1880.
Aecidium Ipomoeae Speg. Anal. Soc. Ci. Argent. **9**: 173. 1880.
Dicaeoma opulentum Kuntze, Rev. Gen. 3^3: 469. 1898.

O. Pycnia not seen.

I. Aecia hypophyllous, scattered or loosely gregarious on yellow spots, irregular in outline, 1–4 mm. across, short-cylindric, 0.3–0.4 mm. in diameter; peridium whitish, erose; peridial cells rhombic, 18–26 by 30–40 μ, the outer wall nearly smooth, 4–6 μ thick, the inner wall rather coarsely and deeply fimbriate-verrucose, 6–9 μ thick; aeciospores globoid, 18–24 by 21–31 μ; wall colorless, 3–3.5 μ thick, conspicuously verrucose.

III. Telia chiefly epiphyllous, scattered or arising from around or opposite the aecia, roundish or oval in outline, 0.2–1 mm. across, rather early naked, dark chocolate-brown or blackish, pulvinate, somewhat pulverulent; teliospores ellipsoid, 24–35 by 45–70 μ, usually somewhat narrowed at both ends, scarcely constricted at septum; wall dark chestnut-brown,

3.5–4 μ thick, 10–13 μ thick above with a semi-hyaline umbo, sparsely and coarsely tuberculate; pedicel tinted next to spore, up to twice length of spore.

ON CONVOLVULACEAE:
Exogonium arenarium Choisy (*Ipomoea arenaria* Steud., *I. Steudelii* Millsp.), St. Thomas.
TYPE LOCALITY: Boca del Riachuelo, Argentina, on *Ipomoea acuminata*.
DISTRIBUTION: West Indies; also in South America.

24. **Allodus crassipes** (Berk. & Curt.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia crassipes Berk. & Curt. Grevillea **3**: 54. 1874.
?*Aecidium Convolvulinum* Speg. Revista Argent. Hist. Nat. **1**: 398. 1891.
Puccinia Ipomoeae Cooke; Lagerh. Tromsö Mus. Aarsh. **17**: 61. 1895.
Dicaeoma crassipes Kuntze, Rev. Gen. **3**^{3}: 468. 1898.
Dicaeoma Ipomoeae Kuntze, Rev. Gen. **3**^{3}: 469. 1898.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous, gregarious, often distributed over the entire leaf, varying greatly in size and distribution, circular in outline except when on the veins, short-cylindric, 0.2–0.4 mm. in diameter; peridium colorless, erose; peridial cells rhomboidal, 14–21 by 30–42 μ, the outer wall finely striate, 3–4 μ thick, the inner wall rather coarsely verrucose, 3–6 μ thick; aeciospores globoid, 16–22 by 19–26 μ; wall colorless, 1–1.5 μ thick, finely verrucose.

III. Telia amphigenous, grouped about the aecia or less commonly scattered, often confluent, circular in outline, 0.2–0.4 mm. across, early naked, chocolate-brown, pulvinate, slightly pulverulent, ruptured epidermis conspicuous; teliospores ellipsoid, 24–32 by 39–61 μ, usually rounded at both ends; wall dark chestnut-brown, 3–4 μ thick, 6–9 μ thick above with a semi-hyaline umbo, conspicuously and usually coarsely verrucose; pedicel tinted next to spore, stout, up to one and one half times length of spore.

ON CONVOLVULACEAE:
Ipomoea cathartica Poir. (*I. acuminata* R. & S. not R. & P., *Pharbitis cathartica* Choisy), Cuba.
Ipomoea glabriuscula House, Guatemala.
Ipomoea purga (Wender.) Hayne (*I. jalapa* Nutt. & Coxe), Costa Rica; Oaxaca.
Ipomoea purpurea (L.) Roth, Morelos.
Ipomoea tiliacea (Willd.) Choisy (*I. fastigiata* Sweet), Guatemala.
Ipomoea trichocarpa Ell. (*I. carolina* Pursh, *I. commutata* R. & S.), Florida, Georgia, Louisiana, South Carolina, Texas.
Ipomoea trifida (H.B.K.) G. Don, Costa Rica.
Ipomoea triloba L., Florida; Cuba; Mona Island; Porto Rico; St. Croix.
TYPE LOCALITY: Santee Canal, South Carolina, on *Ipomoea trichocarpa*.
DISTRIBUTION: South Carolina to Texas, Central America, and the West Indies; also in South America.
EXSICCATI: Barth. Fungi Columb. *2456, 4853;* Barth. N. Am. Ured. *1805;* Rav. Fungi Am. *792*.

25. **Allodus megalospora** Orton, Mem. N. Y. Bot. Gard. **6**: 198. 1916.

Puccinia megalospora Arth. & Johnston, Mem. Torrey Club **17**: 152. 1918.
Puccinia macrocephala Speg. Bol. Acad. Nac. Ci. Cordoba **23**: 445. 1919.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous, occurring singly or in small groups, cylindric, 0.2–0.5 mm. in diameter; peridium white, erose at first, soon becoming lacerate, up to 0.6 mm. high; peridial cells rhombic or rhomboidal, 16–25 by 31–45 μ, the outer wall 4–6 μ thick, striate, the inner wall 6–10 μ thick, rather coarsely verrucose; aeciospores globoid or broadly ellipsoid, 19–28 by 23–34 μ; wall colorless, 1.5–2 μ thick, finely and closely verrucose.

III. Telia chiefly epiphyllous, occurring singly or in groups, often arising opposite or around and among the aecia, circular in outline, 0.2–0.6 mm. in diameter, early naked, often becoming confluent and forming large sori, up to 5 mm. across, pulvinate, pulverulent, blackish-brown, ruptured epidermis rather conspicuous; teliospores ellipsoid, 23–32 by 48–70 μ, narrowed or rounded above, rounded below, slightly constricted at septum; wall vinous- or chocolate-brown, 3–4 μ thick, rather coarsely verrucose, 9–15 μ thick above, nearly concolorous, somewhat paler at apex; pedicel tinted next to spore, stout, up to 115 μ long.

ON CONVOLVULACEAE:
Ipomoea arborescens (Humb. & Bonpl.) G. Don, Guerrero.
Ipomoea carolina L. not Pursh (*I. heptaphylla* Griseb.), Cuba.
Ipomoea intrapilosa Rose, Jalisco, Morelos, Oaxaca.
Ipomoea murucoides R. & S., Morelos, Oaxaca.
TYPE LOCALITY: Oaxaca, Mexico, on *Ipomoea murucoides*.
DISTRIBUTION: Southern Mexico and the West Indies; also in South America.
EXSICCATI: Barth. Fungi Columb. *5067;* Barth. N. Am. Ured. *429, 1907;* Sydow, Ured. *2036*.

26. **Allodus insignis** (Holway) Orton, Mem. N. Y. Bot. Gard. **6**: 197. 1916.

Puccinia insignis Holway, Ann. Myc. **2**: 392. 1904.

O. Pycnia not seen.

I. Aecia of secondary form epiphyllous, occurring singly or in groups of two to five on rather large yellow spots, surrounded by the telia, short-cylindric, 0.2–0.3 mm. in diameter; peridium colorless; peridial cells rhombic, 20–25 by 29–35 μ, the outer wall 3–5 μ thick, inconspicuously striate, the inner wall 4–6 μ thick, coarsely verrucose; aeciospores globoid, 21–26 by 24–29 μ; wall colorless, 1–1.5 μ thick, distinctly verrucose.

III. Telia epiphyllous, loosely grouped about the aecia, or arising from the aecia, rarely confluent, circular in outline, 0.1–0.3 mm. across, opening by an apical ostiole, pulvinate, compact, blackish-brown, ruptured epidermis conspicuous; teliospores ellipsoid or terete, 25–31 by 52–70 μ, abruptly narrowed above, rounded below; wall dark chestnut-brown, 3–3.5 μ thick, prolonged into a beak above, 12–23 μ thick, golden-brown, indistinctly striate-verrucose; pedicel slightly tinted next to the spore, stout, up to 85 μ long.

ON CONVOLVULACEAE:
Ipomoea Wolcottiana Rose, Morelos.
TYPE LOCALITY: Cuernavaca, Mexico, on *Ipomoea* sp., now determined as *I. Wolcottiana*.
DISTRIBUTION: Southern Mexico.

27. **Allodus nocticolor** (Holway) Orton, Mem. N. Y. Bot. Gard. **6**: 197. 1916.

Puccinia nocticolor Holway, Ann. Myc. **2**: 391. 1904.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous, gregarious, on yellow spots, circular in outline or elongate on the veins, cylindric, 0.3–0.5 mm. in diameter; peridium colorless, up to 2 mm. long, becoming lacerate and falling away at maturity; peridial cells crescent-shaped, 16–24 by 32–55 μ, the outer wall 3–5 μ thick, appearing nearly smooth, the inner wall 7–10 μ thick, deeply fimbriate-verrucose; aeciospores globoid, 19–24 by 24–31 μ; wall colorless, 2–3 μ thick, 5–8 μ thick above, very finely verrucose.

III. Telia chiefly epiphyllous, gregarious, arising opposite or from around and among the aecia, circular in outline, 0.2–0.5 mm. in diameter, early naked, soon becoming confluent and forming large sori up to 3 mm. across, pulvinate, conspicuously pulverulent, blackish, ruptured epidermis not conspicuous; teliospores terete or fusiform, 26–35 by 50–75 μ, narrowed or constricted above, usually rounded below; wall dark chocolate-brown, 4–5 μ thick, prolonged into a beak above, 12–19 μ thick, slightly paler at the tip, coarsely and sparsely tuberculate; pedicel slightly tinted close to spore, swelling below to twice its normal diameter, about twice length of spore.

ON CONVOLVULACEAE:
Ipomoea fistulosa Mart., Guatemala.
Ipomoea intrapilosa Rose, Morelos, Puebla.
TYPE LOCALITY: Cuernavaca, Mexico, on *Ipomoea intrapilosa*.
DISTRIBUTION: Central Mexico to Guatemala.
EXSICCATI: Barth. N. Am. Ured. *1461*.

28. **Allodus superflua** (Holway) Orton, Mem. N. Y. Bot. Gard. **6**: 198. 1916.

Puccinia superflua Holway, Ann. Myc. **2**: 392. 1904.

O. Pycnia not seen.

I. Aecia hypophyllous, occurring singly or gregarious on discolored spots, short-cylindric,

0.2–0.5 mm. in diameter; peridium whitish, becoming lacerate and revolute, easily falling away; peridial cells cylindric or rhomboidal, 10–19 by 33–47 μ, the outer wall 1.5–2 μ thick, striate, the inner wall 5–7 μ thick, prominently verrucose, often much thicker at apex; aeciospores globoid, 16–19 by 21–26 μ; wall colorless, 2–2.5 μ thick, coarsely verrucose.

III. Telia chiefly epiphyllous, scattered or gregarious, arising opposite or from the aecia, circular in outline, 0.1–0.4 mm. in diameter, early naked, soon becoming confluent and forming conspicuous sori up to 3 mm. across, pulvinate, conspicuously pulverulent, blackish-brown, ruptured epidermis rather conspicuous; teliospores ellipsoid, 25–34 by 46–64 μ, narrowed above, rounded below, very slightly constricted at septum; wall dark chestnut- or chocolate-brown, 3.5–5 μ thick, coarsely and sparsely verrucose, prolonged into a beak above, 8–12 μ thick, concolorous; pedicel tinted next to spore, up to one and one half times length of spore.

ON CONVOLVULACEAE:
Ipomoea arborescens (H. & B.) G. Don, Guerrero.
TYPE LOCALITY: Iguala, Mexico, on "*Ipomoea murucoides*," error for *I. arborescens*.
DISTRIBUTION: Known only from the type locality.

29. **Allodus rubicunda** (Holway) Arthur & Orton.

Puccinia rubicunda Holway, Ann. Myc. 2: 392. 1904.

O. Pycnia not seen.

I. Aecia chiefly epiphyllous, occurring singly or in loose groups of varying size, pulvinate, 0.2–0.6 mm. in diameter, opening by an apicular ostiole; peridium whitish, scarcely protruding above the overarching epidermis, erose; peridial cells rhomboidal, 16–20 by 32–40 μ, the outer wall 2–2.5 μ thick, smooth, the inner wall 2.5–4 μ thick, conspicuously verrucose; aeciospores globoid or ovoid, 19–23 by 23–29 μ; wall colorless, 2.5–3 μ thick, coarsely verrucose.

III. Telia epiphyllous, scattered, or in circinating groups around the aecia, or from the old aecial cups, orbicular, about the same size as the aecia, rather early naked, epidermis opening by an apical ostiole, pulvinate, slightly pulverulent, blackish-brown, overarching epidermis conspicuous; teliospores broadly ellipsoid, 27–32 by 40–47 μ, usually rounded at both ends, rarely narrowed above, not constricted at septum; wall dark vinous-brown, 3–4 μ thick, rather coarsely tuberculate, usually uniform, rarely thickened to 6 μ above and slightly paler, pores 2 in each cell near the septum; pedicel colorless, delicate, up to length of spore.

ON CONVOLVULACEAE:
Ipomoea fistulosa Mart., Veracruz.
TYPE LOCALITY: Near Veracruz, Mexico, on *Ipomoea* sp., now determined as *I. fistulosa*.
DISTRIBUTION: Known only from the type locality.

30. **Allodus Giliae** (Peck) Orton, Mem. N Y. Bot. Gard. 6: 199. 1916.

Aecidium Giliae Peck, Bot. Gaz. 4: 230. 1879.
Puccinia plumbaria Peck, Bot. Gaz. 6: 228. 1881.
Puccinia Wilcoxiana Thüm. Myc. Univ. *2032*. 1881.
Puccinia plumbaria phlogina Ellis, N. Am. Fungi *1044*, hyponym. 1883.
Aecidium Wilcoxianum Thüm. Myc. Univ. *2226*, hyponym. 1884.
Aecidium Cerastii Wint.; Wint. & Demetrio, Hedwigia 24: 179. 1885; Jour. Myc. 1: 126. 1885.
Aecidium Phlogis Peck; Arth. Bull. Iowa Agr. Coll. 1884: 167, hyponym. 1885.
Puccinia patagonica Speg. Bol. Acad. Nac. Ci. Cordoba 11: 29. 1887.
Puccinia fragilis Tracy & Gall. Jour. Myc. 4: 20. 1888.
Aecidium Phlogis Ellis & Ev. Bull. Torrey Club 24: 284. 1897.
Puccinia Purpusii P. Henn. Hedwigia 37: 270. 1898.
Puccinia giliicola P. Henn. Hedwigia 37: 270. 1898; Rab.-Paz. Fungi Eur. *4221*. 1901.
Dicaeoma fragile Kuntze, Rev. Gen. 3^3: 468. 1898.
Dicaeoma plumbarium Kuntze, Rev. Gen. 3^3: 470. 1898.
Aecidium patagonicum Speg. Anal. Mus. Nac. Buenos Aires III. 1: 66. 1902.
Allodus plumbaria Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia amphigenous, scattered among the aecia, globoid, 100–130 μ in diameter, honey-yellow.

I. Aecia hypophyllous, numerous, distributed rather evenly and thickly over large areas, often over the entire under surface of leaf, cupulate, short, 0.3–0.7 mm. in diameter; peridium yellowish, the margin spreading or somewhat recurved, irregularly lacerate; peridial cells rhombic, 16–25 by 26–32 μ, the outer wall 5–10 μ thick, striate, the inner wall 3–6 μ thick, rather coarsely verrucose; aeciospores globoid, 13–19 by 14–22 μ; wall about 1 μ thick, colorless, very minutely verrucose, appearing smooth in water.

III. Telia caulicolous and foliicolous, chiefly hypophyllous, arising from among the aecia or scattered on other parts of the plant, oval or irregular in outline, 0.2–1.5 mm. or more across, tardily naked, pulvinate, cinereous, somewhat pulverulent, ruptured epidermis conspicuous; teliospores ellipsoid, 19–25 by 31–45 μ, usually rounded at both ends, slightly or not constricted at septum; wall light chestnut-brown, 2–2.5 μ thick, finely and moderately verrucose, 4–7 μ thick above, slightly paler at apex; pedicel short, fragile, colorless.

ON POLEMONIACEAE:
Leptodactylon californica H. & A. (*Gilia californica* Benth.), California.
Leptodactylon Nuttallii (A. Gray) Rydb. (*Gilia Nuttallii* A. Gray), Colorado, Nevada, Utah.
Linanthus ciliatus (Benth.) Greene (*Gilia ciliata* Benth.), California.
Microsteris gracilis (Dougl.) Greene (*Collomia gracilis* Dougl., *Gilia gracilis* Hook.), California, Montana, Oregon, Utah, Washington.
Microsteris humilis Greene, Idaho, Utah.
Microsteris micrantha (Kellogg) Greene (*Collomia micrantha* Kellogg), Colorado, Idaho, Montana, Utah.
Phlox depressa (E. Nelson) Rydb., Colorado.
Phlox divaricata L., Illinois, Iowa, Missouri.
Phlox longifolia Nutt., California, Colorado, Idaho, Nevada, New Mexico, Utah.
Phlox multiflora A. Nelson, Colorado.
Phlox pilosa L., Texas.
Phlox speciosa Pursh, Oregon.
Phlox Stansburyii (Torrey) A. Heller, Nevada.

TYPE LOCALITY: Alta, Wasatch Mountains, Utah, on *Gilia Nuttallii*.

DISTRIBUTION: Illinois to Washington, and southward to southern California and Colorado; also in South America.

EXSICCATI: Barth. Fungi Columb. *3857, 4761;* Barth. N. Am. Ured. *162, 254, 255, 360, 1362;* Ellis, N. Am. Fungi *1044, 1432;* Ellis & Ev. Fungi Columb.*763, 1861, 1970;* Ellis & Ev. N. Am. Fungi *1831, 3582;* Garrett, Fungi Utah. *1, 2, 3, 37, 38;* Rab.-Paz. Fungi Eur. *4221;* Rab.-Wint. Fungi Eur. *3519;* Roum. Fungi Gall. *3926;* Roum. Fungi Sel. *5213;* Sydow, Ured. *1212, 1527, 1936, 1937, 1938, 1939;* Thüm. Myc. Univ. *2032, 2226*.

31. **Allodus Douglasii** (Ellis & Ev.) Orton, Mem. N. Y. Bot. Gard. **6**: 198. 1916.

Puccinia Douglasii Ellis & Ev. Proc. Acad. Phila. **1893**: 152. 1893.
Dicaeoma Douglasii Kuntze, Rev. Gen. **3**^{3}: 468. 1898.
Puccinia Richardsonii Sydow, Monog. Ured. **1**: 317. 1902.

O. Pycnia amphigenous, scattered among the aecia, flattened globoid, deep seated, 75–100 μ in diameter; ostiolar filaments prominent.

I. Aecia hypophyllous, distributed rather unevenly over considerable portions of the under leaf-surface, cylindric, short, 0.3–0.4 mm. in diameter; peridium whitish, the margin lacerate or erose; peridial cells rhombic or rhomboidal, 19–26 by 20–37 μ, the outer wall 7–10 μ thick, striate, the inner wall 3–5 μ thick, moderately verrucose; aeciospores globoid, 13–19 by 18–21 μ; wall about 1 μ thick, very finely verrucose.

III. Telia chiefly hypophyllous, arising from among or within the aecia, or oftener occurring in two series, on opposite sides of the midrib, oval in outline, 0.5–0.8 mm. across, often becoming longitudinally confluent, pulvinate, early naked, somewhat pulverulent, dark chocolate-brown or blackish, ruptured epidermis somewhat conspicuous; teliospores ellipsoid or pyriform, 16–24 by 34–58 μ, rounded or narrowed above, usually narrowed below, somewhat constricted at septum; wall chestnut-brown, smooth, 1.5–2 μ thick, 7–12 μ thick above, appearing slightly paler at apex; pedicel golden- or cinnamon-brown, rather stout, about length of spore.

ON POLEMONIACEAE:
Phlox alyssifolia Greene, Montana.
Phlox amoena Sims (*P. procumbens* A. Gray), Pennsylvania.
Phlox canescens T. & G., Utah.
Phlox depressa (A. Nelson) Rydb., Utah.
Phlox diapensioides Rydb., Montana.
Phlox diffusa Benth., Oregon, Utah, Washington.
Phlox glabrata (E. Nelson) A. Brand, Wyoming.
Phlox Hoodii Richards., Montana.
Phlox nana Nutt., New Mexico.
Phlox rigida Benth., Utah, Washington.
Phlox scleranthifolia Rydb., Nebraska.
Phlox subulata L., New Jersey.

TYPE LOCALITY: Detroit, Utah, on "*Phlox Douglasii,*" error for *P. diffusa*.

DISTRIBUTION: New Jersey to Washington, and in the Rocky Mountain region southward to New Mexico.

EXSICCATI: Barth. N. Am. Ured. *54;* Ellis & Ev. Fungi Columb. *1466;* Ellis & Ev. N. Am. Fungi *2991;* Garrett, Fungi Utah. *28*.

32. **Allodus yosemitana** (Blasdale) Arthur & Orton.

Puccinia yosemitana Blasdale, Univ. Calif. Publ. Bot. **7**: 150. 1919.

O. Pycnia not seen.

I. Aecia hypophyllous, in groups or solitary, cylindric, 0.8–1 mm. long; peridium yellowish or orange, the margin erect and erose; peridial cells broadly oblong, in longitudinal section 17–23 by 25–29 μ, slightly overlapping by a downward projection of the outer wall, the outer wall 7–10 μ thick, transversely striate, the inner wall thinner, 2–2.5 μ, closely verrucose; aeciospores irregularly ellipsoid or globoid, 16–19 by 16–23 μ; wall colorless, thin, 1 μ or less, very finely and closely verrucose.

III. Telia hypophyllous, scattered or solitary, prominent, round or oblong, 0.5–1.5 mm. long, strongly pulvinate, blackish, ruptured epidermis inconspicuous; teliospores ellipsoid, 21–26 by 32–39 μ, rounded at both ends, or somewhat narrowed below, slightly or not constricted at septum; wall chestnut-brown, thin, 1 μ, 2–4 μ thick above; pedicel slightly tinted or appearing colorless, firm, usually about length of spore.

ON POLEMONIACEAE:
Leptodactylon Hookeri (Dougl.) Nutt. (*Phlox Hookeri* Dougl., *Gilia pungens Hookeri* A. Gray), California.
TYPE LOCALITY: Yosemite Valley, California, on *Gilia pungens Hookeri*.
DISTRIBUTION: Known only from the type locality.

33. **Allodus mellifera** (Dietel & Holway) Arth.

Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia mellifera Dietel & Holway; Dietel, Erythea **1**: 25. 1893.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous, gregarious or scattered, cylindric, up to 1.2 mm. long, 0.3–0.5 mm. in diameter, the epidermis overarching and opening by a central ostiole; peridium whitish, erect, soon becoming irregularly and deeply lacerate; peridial cells rhomboidal or pyriform, 17–25 by 31–62 μ, the outer wall 7–10 μ thick, smooth, the inner wall 5–6 μ thick, finely rugose; aeciospores globoid, 19–23 by 22–32 μ; wall light cinnamon-brown when mature, 3–4 μ thick, often appearing thicker, not uniform, very finely verrucose, the pores visible, scattered.

III. Telia at first caulicolous, later amphigenous, scattered, circular or oval in outline, 0.5–2 mm. across, rather tardily naked, pulvinate, slightly pulverulent, chocolate-brown or blackish, ruptured epidermis not conspicuous; teliospores broadly ellipsoid, 25–31 by 40–48 μ, rounded above and below, slightly constricted at septum; wall dark chestnut-brown, 3–5 μ thick, smooth, 7–9 μ thick above; pedicel colorless, fragile, about twice length of spore.

ON LAMIACEAE:
Audibertella incana (Benth.) Briq. (*Audibertia incana* Benth., *Ramona incana* Briq.), Nevada.
Audibertella grandiflora (Benth.) Briq. (*Audibertia grandiflora* Benth., *Salvia spathacea* Greene, *Ramona grandiflora* Briq.), California.
Audibertella Palmeri (A. Gray) Briq. (*Audibertia Palmeri* A. Gray), California,
Audibertella polystachya (Benth.) Briq. (*Audibertia polystachya* Benth.), California.
Audibertella stachyoides (Benth.) Briq. (*Audibertia stachyoides* Benth., *Salvia mellifera* Greene, *Ramona stachyoides* Briq.), California.
TYPE LOCALITY: Pasadena, California, on *Salvia mellifera*.
DISTRIBUTION: Central California and western Nevada.
EXSICCATI: Barth. N. Am. Ured. *457*.

34. **Allodus vertisepta** (Tracy & Gall.) Arth.

Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia vertisepta Tracy & Gall. Jour. Myc. **4**: 21. Mr 1888.
Diorchidium Tracyi De-Toni, in Sacc. Syll. Fung. **7**: 736. O 1888.

O. Pycnia epiphyllous, gregarious, deep-seated, globoid, 75–140 μ in diameter by 65–110 μ high, honey-yellow; ostiolar filaments up to 30 μ long.

I. Aecia chiefly epiphyllous, gregarious, in annular groups 0.5–2 mm. across on yellowish spots, cupulate, short, 0.2–0.3 mm. across; peridium yellowish, delicate, evanescent; peridial cells ellipsoid or rhomboidal, 16–22 by 28–34 μ, the outer wall 2.5–3 μ thick, nearly smooth,

the inner wall 1.5–2 μ thick, finely verrucose, the tubercles deciduous; aeciospores ellipsoid, 17–20 by 28–40 μ; wall golden-brown, 2–3 μ thick, rather prominently verrucose, considerably thickened above and below, 5–9 μ.

III. Telia amphigenous, scattered, nearly circular in outline, 0.1–0.3 mm. across, rarely confluent, early naked, dark chocolate-brown, pulvinate, pulverulent, ruptured epidermis not evident; teliospores globoid in face view, ellipsoid in lateral view, 26–28 by 25–31 μ, slightly constricted at septum; wall dark chestnut- or chocolate-brown, 2.5–3 μ thick, rather finely and moderately verrucose, the tubercles sometimes deciduous, 6–7 μ thick above, nearly hyaline at the extreme tip; pedicel colorless, fragile, about once to once and a half length of spore, often attached laterally near the septum.

ON LAMIACEAE:
?*Salvia pinguifolia* (Fernald) Wooton & Standley, New Mexico.
Salvia Sessei Benth., Morelos.
TYPE LOCALITY: New Mexico, on "*Salvia ballotaeflora*," probably *S. pinguifolia*.
DISTRIBUTION: Southern New Mexico to southern Mexico.
ILLUSTRATION: Jour. Myc. **5**: *pl. 10, f. 4.*
EXSICCATI: Barth. N. Am. Ured. *275, 875.*

35. **Allodus Chamaesarachae** (Sydow) Arth. Result. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia Chamaesarachae Sydow, Monog. Ured. **1**: 263. 1902.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous, from a diffused mycelium, scattered rather thickly and evenly over the entire under side of the leaf, cupulate, short, 0.2–0.6 mm. across; peridium yellowish, erose, delicate; peridial cells rhomboidal, 16–20 by 29–40 μ, considerably overlapping, the outer and inner walls of about the same thickness, 2.5–3 μ, the outer inconspicuously striate, the inner verrucose; aeciospores globoid, 16–20 by 20–26 μ; wall nearly colorless, 1.5–2 μ thick, finely verrucose.

III. Telia amphigenous, arising from among and within the aecia, oval or circular in outline, 0.2–0.7 mm. across, often confluent, early naked, chocolate-brown, pulvinate, pulverulent, ruptured epidermis not conspicuous; teliospores broadly ellipsoid, 17–21 by 25–32 μ, usually rounded at both ends, somewhat constricted at septum; wall light chestnut-brown, about 2 μ thick, very finely verrucose, about 3 μ thick above; pedicel colorless, short.

ON SOLANACEAE:
Chamaesaracha nana A. Gray, California, Nevada.
TYPE LOCALITY: [Truckee, Nevada County] California, on *Chamaesarcha nana*.
DISTRIBUTION: Eastern California, and Nevada.
EXSICCATI: Barth. Fungi Columb. *3840;* Barth. N. Am. Ured. *229;* Ellis, N. Am. Fungi *1476*.

36. **Allodus Acnisti** (Arth.) Arthur & Orton.

Puccinia Acnisti Arth. Bot. Gaz. **65**: 470. 1918.
Puccinia Nicotianae Arth. Bot. Gaz. **65**: 470. 1918. (Error, see Bot. Gaz. **68**: 148. 1919.)

O. Pycnia epiphyllous, numerous, scattered or somewhat grouped, noticeable, honey-yellow or dark-brown, globoid or ellipsoid, 70–115 by 80–130 μ; ostiolar filaments up to 50 μ long.

I. Aecia chiefly hypophyllous, scattered or sometimes in small groups about 1–3 mm. in diameter, short-cylindric, 0.1–0.2 mm. in diameter, 0.3–0.7 mm. high; peridium white, lacerate, soon falling apart; peridial cells rectangular or rhomboidal, 10–14 by 22–26 μ, slightly overlapping, the outer wall 3–4 μ thick, transversely striate, the inner wall about 3 μ thick, closely and somewhat coarsely rugose-verrucose; aeciospores ellipsoid, 14–19 by 16–27 μ; wall colorless or slightly tinted, 1–2 μ thick, finely and very closely verrucose.

III. Telia mostly epiphyllous, scattered, round, minute, 0.1–0.2 mm. in diameter, compact, becoming somewhat pulverulent, shining blackish-brown, ruptured epidermis evident; teliospores ellipsoid or oblong, 19–24 by 27–40 μ, rounded above and below, not or slightly constricted at septum; wall dark chestnut-brown, uniformly 2.5–3 μ thick, inconspicuously verrucose, sometimes appearing striately verrucose; pedicel yellowish, slightly darker above, somewhat fragile.

Gnaphalium Macounii Greene (*G. decurrens* Ives, not L.), Arizona, New York, Vermont; Ontario.
Gnaphalium obtusifolium L. (*G. polycephalum* Michx.), New York, Pennsylvania, West Virginia.
Gnaphalium oxyphyllum DC., Mexico (state).
Gnaphalium ramosissimum Nutt., California.
Gnaphalium semiamplexicaule DC., Mexico (state).
Gnaphalium sp., Oaxaca, Veracruz; Guatemala.

TYPE LOCALITY: Bethlehem, Pennsylvania, on *Gnaphalium polycephalum*.
DISTRIBUTION: On the Atlantic and Pacific borders of North America.
EXSICCATI: Barth. N. Am. Ured. *549;* Ellis & Ev. Fungi Columb. *1285, 1764;* Ellis & Ev. N. Am. Fungi *3569;* Sydow, Ured. *1773.*

46. **Allodus Desmanthodii** (Dietel & Holway) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Puccinia Desmanthodii Dietel & Holway; Holway, Bot. Gaz. **31**: 334. 1901.

O. Pycnia not seen.

I. Aecia amphigenous, in small, loose groups on discolored areas, sometimes occurring singly, 0.2–0.3 mm. in diameter, cupulate, short; peridium when old falling away and leaving the raised epidermis conspicuous; peridial cells rhomboidal, 18–21 by 30–40 μ, the outer wall 5–7 μ thick, striate, the inner wall about 3 μ thick, rather coarsely verrucose; aeciospores globoid, 14–19 by 17–20 μ; wall colorless, 1–1.5 μ thick, with deciduous tubercles.

III. Telia hypophyllous, gregarious, over large areas 20 mm. or more across, round, punctiform or pulvinate, long covered by the epidermis, with dark-brown stromata lining the sori; teliospores elliptic or terete, 12–16 by 45–61 μ, rounded or narrowed at both ends, slightly or not constricted at septum; wall cinnamon-brown, 1.5–2 μ thick, smooth, 5–8 μ thick above, concolorous; pedicel cinnamon-brown, up to length of spore.

ON CARDUACEAE:
Desmanthodium fruticosum Greenman, Jalisco.
Desmanthodium ovatum Benth., Oaxaca.
TYPE LOCALITY: Oaxaca, Mexico, on *Desmanthodium ovatum*.
DISTRIBUTION: South-central Mexico.
EXSICCATI: Barth. N. Am. Ured. *234, 1540.*

47. **Allodus Ancizari** (Mayor) Arthur & Orton.

Puccinia Ancizari Mayor, Mém. Soc. Neuch. Sci. Nat. **5**: 525. 1913.

O. Pycnia amphigenous, crowded in small groups 0.2–0.5 mm. across, noticeable, honey-yellow becoming light-brown, globoid or ellipsoid, 128–160 by 145–175 μ; ostiolar filaments 95–115 μ long, projecting slightly beyond the ostiole.

I. Aecia amphigenous, few, in groups with the pycnia on slightly yellowish spots, globoid, deep-seated, long covered by the overarching host-tissue, finally opening by a small pore; peridium wanting; aeciospores ellipsoid or globoid, 21–28 by 32–45 μ; wall colorless, 1.5–2.5 μ thick, closely or moderately echinulate.

III. Telia hypophyllous, scattered or in small groups, round, 0.2–0.8 mm. in diameter, early naked, pulvinate, golden-brown, becoming somewhat cinereous from germination, ruptured epidermis inconspicuous; teliospores oblong or ellipsoid, 23–29 by 60–77 μ, rounded above and below, somewhat constricted at septum; wall colorless or pale-yellow, thin, 1 μ, thickened above by an umbo up to 7 μ, smooth; pedicel colorless, fragile, up to half length of spore.

ON CARDUACEAE:
Baccharis lancifolia Less., Guatemala.
TYPE LOCALITY: Antioquia, Colombia, on *Baccharis nitida*.
DISTRIBUTION: Guatemala; also in South America.

48. **Allodus cornuta** (Jackson & Holway) Arthur & Orton.

Puccinia cornuta Jackson & Holway; Arth. Am. Jour. Bot. **5**: 533. 1918.

O. Pycnia chiefly epiphyllous, occasionally amphigenous on the veins, crowded on yellowish areas 1–1.5 cm. across, conspicuous, dark-brown, globoid, 75–100 μ in diameter; ostiolar filaments 70–80 μ long.

I. Aecia hypophyllous, scattered, usually on the veins with the telia, long-cylindric and slightly curved, 2–3 mm. long, 0.1 mm. in diameter, soon breaking up into cylindric fragments;

peridium cinnamon-brown; peridial cells light cinnamon-brown, narrowly rhomboidal, 7–10 by 42–55 μ in longitudinal section, overlapping, the wall 2 μ thick, very finely and closely verrucose; aeciospores irregularly and angularly globoid or oblong, 15–26 by 26–40 μ; wall yellowish or pale golden-brown, 1 μ thick, thickened up to 7 μ above, smooth below, rather coarsely and closely verrucose above.

III. Telia mostly hypophyllous, arising from the veins and following the aecia on the same discolored areas, giving a dendritic appearance, oblong, 0.2–0.6 mm. across, early naked, prominent, chocolate-brown or blackish, ruptured epidermis inconspicuous; teliospores ellipsoid, 23–26 by 32–40 μ, rounded above and below, slightly or not constricted at septum; wall dark chestnut-brown, uniformly 2.5–3 μ thick, closely and prominently verrucose; pedicel colorless, persistent, two to three times length of spore.

ON CARDUACEAE:
Notoptera brevipes (B. L. Robinson) Blake, Guatemala.
TYPE LOCALITY: Guatemala City, Guatemala, on *Notoptera brevipes*.
DISTRIBUTION: Guatemala.

49. **Allodus subcircinata** (Ellis & Ev.) Arth.
Résult. Sci. Congr. Vienne 345. 1906.

Puccinia subcircinata Ellis & Ev. Jour. Myc. **3**: 56. 1887.

O. Pycnia amphigenous, in small groups surrounded by the aecia, noticeable, conoidal; ostiolar filaments prominent.

I. Aecia chiefly hypophyllous, in annular groups up to 7 mm. across, surrounding the pycnia, on conspicuous yellowish spots, or amphigenous, in loose groups, sometimes annular, rarely more than 4 mm. across, rarely occurring singly, 0.2–0.3 mm. in diameter, short, cupulate; peridium whitish, recurved, lacerate; peridial cells rhombic or rhomboidal, sometimes squarish, 19–29 by 21–31 μ, the outer wall 5–7 μ thick, striate, the inner wall 1.5–2.5 μ thick, verrucose; aeciospores globoid, 16–19 by 17–21 μ; wall colorless, 1–1.5 μ thick, inconspicuously verrucose.

III. Telia amphigenous, gregarious, arising around the aecia on yellowish-brown spots, or later independently, circular in outline, 0.2–0.6 mm. across, later becoming confluent to form large sori, somewhat pulvinate, very pulverulent, early naked, dark chestnut-brown, ruptured epidermis rather conspicuous; teliospores broadly ellipsoid, 15–21 by 25–32 μ, usually rounded at both ends, moderately constricted at septum; wall light chestnut-brown, 1.5–2 μ thick, smooth, sometimes 3 μ thick above; pedicel colorless, fragile, rarely as long as spore.

ON CARDUACEAE:
Senecio columbianus Greene (*S. atriapiculatus* Rydb.), Washington.
Senecio crassulus A. Gray, Colorado, Utah, Wyoming.
?*Senecio hydrophilus* Nutt., Washington.
?*Senecio hydrophilus pacificus* Greene, California.
Senecio integerrimus Nutt., Nebraska.
?*Senecio lugens* Richards., California.
Senecio perplexus dispar A. Nelson (*S. dispar* A. Nelson), Utah.
Senecio taraxacoides (A. Gray) Greene, Colorado.
Senecio triangularis Hook., Idaho, Utah, Washington; Alberta.
Senecio sp., New Mexico, South Dakota.
TYPE LOCALITY: Mt. Paddo, Washington, on *Senecio triangularis*.
DISTRIBUTION: Nebraska to Alberta and southward to California.
EXSICCATI: Barth. Fungi Columb. *4468;* Barth. N. Am. Ured. *1371, 1372;* Ellis & Ev. Fungi Columb. *1459;* Ellis & Ev. N. Am. Fungi *1840;* Garrett, Fungi Utah. *29, 106, 238;* Sydow, Ured. *782, 1943*.

34. **KLEBAHNIA** Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Cycle of development includes pycnia, uredinia and telia, the alternating phases not marked; autoecious. Pycnia and other sori subepidermal.

Pycnia deep-seated in the tissues of the host, globoid or flask-shaped, with protruding ostiolar filaments.

Uredinia erumpent, definite, applanate or somewhat pulvinate, without paraphyses or peridium, in some species of two sorts, primary and secondary; the primary uredinia differ in appearance only slightly if at all from the secondary, the difference shown mostly in robust-

ness, especially in size of spores and thickness of wall. Urediniospores borne singly on pedicels, the length less than twice the breadth; wall colored, occasionally laminate, echinulate, with the pores variable in number and position.

Telia erumpent, definite, on a limited or diffused mycelium. Teliospores free, pedicelled, one-celled, sometimes germinating in the sorus at maturity; wall colored or colorless, smooth, with one apical pore.

Type species, *Uromyces Glycyrrhizae* Magn. (on *Glycyrrhiza lepidota*).

Host belonging to family Fabaceae.
- Uredinia and telia from a limited mycelium. — 1. *K. yurimaguasensis.*
- Uredinia and telia from a diffused mycelium.
  - Urediniospores with 2 pores. — 2. *K. Glycyrrhizae.*
  - Urediniospores with 5 or 6 pores. — 3. *K. hyalina.*

Host belonging to family Convolvulaceae. — 4. *K. gemmata.*

Host belonging to family Heliotropiaceae. — 5. *K. dolichospora.*

Host belonging to family Carduaceae.
- Urediniospores with 3 pores. — 6. *K. pressa.*
- Urediniospores with 2 pores.
  - Urediniospore-wall thin, 1–1.5 μ. — 7. *K. Montanoae.*
  - Urediniospore-wall thicker, 1.5–3 μ. — 8. *K. Bidentis.*

1. **Klebahnia yurimaguasensis** (P. Henn.) Arthur.

Uromyces yurimaguasensis P. Henn. Hedwigia **43**: 157. 1904.

O. Pycnia epiphyllous, crowded in small groups 0.3–0.5 mm. in diameter, opposite the uredinia, conspicuous, dark-brown, punctiform, globoid, 80–144 μ in diameter by 103–144 μ high; ostiolar filaments 64–107 μ long, not projecting much beyond the ostiole.

II. Uredinia hypophyllous, scattered or crowded in groups 0.5–1 mm. across, round 0.1–0.3 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores with pores in optical section appearing triangular, 23–27 μ wide, with pores in surface view obovoid, 23–24 μ wide, from above elliptic; wall cinnamon-brown, 1–1.5 μ thick, moderately and strongly echinulate, the pores 2, approximately equatorial, in the opposite angles of the spore.

III. Telia hypophyllous, scattered, round, 0.2–0.5 mm. in diameter, early naked, somewhat pulverulent, chestnut-brown, ruptured epidermis rather inconspicuous; teliospores globoid or broadly ellipsoid, 19–23 by 19–25 μ; wall cinnamon-brown, 1 μ thick, sometimes thickened up to 3 μ at apex, smooth; pedicel colorless, up to 30 μ long.

ON FABACEAE:
Clitoria arborescens Ait., Panama.
TYPE LOCALITY: Rio Huallaga, Yurimaguas, Peru on *Clitoria* sp.
DISTRIBUTION: Panama; also in South America.

2. **Klebahnia Glycyrrhizae** (Rab.) Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

Uredo Leguminosarum Glycyrrhizae Rab. Flora **33**: 626. 1850.
Uromyces Glycyrrhizae Magnus, Ber. Deuts. Bot. Ges. **8**: 383. 1890.
Caeomurus Glycyrrhizae Kuntze, Rev. Gen. **3**^{3}: 450. 1898.

O. Pycnia mostly hypophyllous, sometimes epiphyllous or caulicolous, numerous, from a diffused mycelium, irregularly and extensively scattered over large areas or sometimes sparsely scattered between other sori, noticeable, yellowish or cinnamon-brown becoming chocolate-brown, conic or flask-shaped, 100–112 μ in diameter by 85–140 μ high; ostiolar filaments free or somewhat agglutinated, 50–80 μ long; pycniospores usually globoid, sometimes ellipsoid, 5 by 5–8 μ.

II. Uredinia mostly hypophyllous, sometimes epiphyllous or caulicolous, numerous, from a diffused mycelium, extensively scattered over large areas, frequently crowded, roundish, 0.2–0.5 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis evident; urediniospores with pores in optical section oblong, 13–17 μ wide, with pores in surface view globoid or obovoid, 23–32 by 24–32 μ; wall dark cinnamon- or chestnut-brown, 1–2 μ thick, finely and moderately or sparsely echinulate, the pores 2, equatorial, opposite.

III. Telia mostly hypophyllous, sometimes epiphyllous or caulicolous, numerous, extensively scattered over large areas, frequently crowded, roundish, 0.2–0.8 mm. across, early

naked, pulverulent, dark chestnut-brown, ruptured epidermis evident; teliospores ellipsoid or obovoid, 15–22 by 23–32 μ, usually rounded above and slightly narrowed below; wall chestnut- or dark cinnamon-brown, 1.5–2.5 μ thick, thickened at apex, 2.5–5 μ, sometimes appearing lighter-colored and umbonate, smooth; pedicel colorless, short, fragile.

ON FABACEAE:
Glycyrrhiza glutinosa Nutt., California.
Glycyrrhiza lepidota Nutt., Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Texas, Utah, Washington, Wyoming.

TYPE LOCALITY: Manfredonia, Carapella, Italy, on *Glycyrrhiza glabra*.

DISTRIBUTION: North Dakota to Washington, and southward to New Mexico and southern California; also in Europe and Asia.

ILLUSTRATIONS: Ber. Deuts. Bot. Ges. **8**: *pl. 20, f. 1–3.*

EXSICCATI: Barth. Fungi Columb. *3693, 3791, 3891, 4188, 4392;* Barth. N. Am. Ured. *90, 290, 594, 686, 888, 987, 1591, 1786, 1984, 2091, 2188;* Brenckle, Fungi Dak. *19;* Clements, Crypt. Form. Colo. *534;* Ellis & Ev. Fungi Columb. *47, 1794;* Ellis & Ev. N. Am. Fungi *1876;* Garrett, Fungi Utah. *98, 99;* D. Griff. W. Am. Fungi *41;* Rab.-Wint. Fungi Eur. *3721;* Seym. & Earle, Econ. Fungi Suppl. *B2a, b;* Sydow, Ured. *502, 503, 1903.*

3. **Klebahnia hyalina** (Peck) Arthur.

Uromyces hyalinus Peck, Bot. Gaz. **3**: 34. 1878.
Uromyces Sophorae Peck, Bull. Torrey Club **12**: 35. 1885.
Caeomurus hyalinus Kuntze, Rev. Gen. **3**^{3}: 450. 1898.
Telospora hyalina Arth. Résult. Sci. Congr. Bot. Vienne 346. 1906.

O. Pycnia amphigenous, scattered or sometimes grouped, inconspicuous, immersed, honey-yellow becoming dark chocolate-brown, conic, 112–150 μ in diameter by 96–144 μ high; ostiolar filaments agglutinated, 50–100 μ long.

II. Uredinia amphigenous and caulicolous, from a diffused mycelium, numerous, usually crowded, covering large parts of the leaf surface, sometimes scattered, circular or oblong, 0.2–1 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores obovoid or ellipsoid, 19–23 by 23–30 μ; wall light cinnamon-brown, 1–2 μ thick, moderately or sparsely and finely echinulate, the pores 5, sometimes 6, approximately equatorial or somewhat scattered.

III. Telia amphigenous and caulicolous, numerous, usually crowded, covering large parts of the leaf-surface, sometimes scattered, arising from a diffused mycelium, circular or elliptic, 0.3–1 mm. across, early or somewhat tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis evident; teliospores ellipsoid or ovoid, sometimes obovoid, 14–19 by 23–31 μ, usually narrowed above and rounded below; wall chestnut- or cinnamon-brown, 1.5–2.5 μ thick, thickened at apex into a lighter-colored, sometimes colorless umbo, 2–5 μ, smooth; pedicel colorless, short, fragile.

ON FABACEAE:
Sophora sericea Nutt., Arizona, Colorado, Kansas, Nebraska, New Mexico, South Dakota, Texas, Wyoming; Chihuahua.

TYPE LOCALITY: Cañon City, Colorado, on *Sophora sericea*.

DISTRIBUTION: South Dakota and Wyoming southward to northern Mexico.

EXSICCATI: Barth. N. Am. Ured. *93, 1987, 2095, 2192;* Carleton, Ured. Am. *35;* Clements, Crypt. Form. Colo. *536;* Ellis & Ev. N. Am. Fungi *2231, 2984;* Ellis & Ev. Fungi Columb. *174, 478, 2187;* Kellerm. & Swingle, Kans. Fungi *49;* Pringle, Mex. Fungi *4, 5;* Rab.-Wint.-Paz. Fungi Eur. *3928;* Seym. & Earle, Econ. Fungi Suppl. *B5a, b;* Sydow, Ured. *1855.*

4. **Klebahnia gemmata** (Berk. & Curt.) Arthur.

Uromyces gemmatus Berk. & Curt.; Berk. Jour. Linn. Soc. **10**: 357. 1869.

O. Pycnia epiphyllous, few, rather loosely arranged in groups or scattered on pale orbicular spots, inconspicuous, honey-yellow, globoid or conic, 80–135 μ in diameter by 85–170 μ high; ostiolar filaments agglutinated, slightly projecting beyond the ostiole.

II. Uredinia mostly hypophyllous, scattered or circinately grouped on pale or brownish spots, round, 0.2–0.7 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 23–29 by 29–39 μ; wall laminate, the middle layer slightly hygroscopic, frequently inconspicuous, colorless, the inner layer light cinnamon-brown, thick, 2–3.5 μ, sparsely and conspicuously echinulate, the pores usually 6–8, scattered, somewhat obscure.

III. Telia hypophyllous, scattered or circinately grouped, sometimes confluent on pale-brownish, orbicular spots, round, 0.2–0.6 mm. in diameter, early naked, somewhat pulverulent, cinnamon-brown, ruptured epidermis evident; teliospores ellipsoid or obovoid, 21–27 by 32–45 μ, rounded above, frequently narrowed below; wall light brownish-yellow or colorless, very thin, 1–1.5 μ or less, considerably thickened above, 7–20 μ, smooth; pedicel colorless, about one and a half times length of spore, delicate.

ON CONVOLVULACEAE:
Jacquemontia nodiflora (Desv.) G. Don, Cuba; Jamaica; Porto Rico; St. Croix.
TYPE LOCALITY: Cuba, on *Convolulus* sp., now determined as *Jacquemontia nodiflora*.
DISTRIBUTION: West Indies.

5. **Klebahnia dolichospora** (Dietel & Holway) Arthur.

Uromyces dolichosporus Dietel & Holway; Holway, Bot. Gaz. **31**: 327. 1901.
Uromyces Tournefortiae P. Henn. Hedwigia **47**: 267. 1908.

O. Pycnia epiphyllous, few, scattered, inconspicuous, honey-yellow, globoid, 135–160 μ in diameter by 125–150 μ high; ostiolar filaments not extending beyond the ostiole.

II. Uredinia amphigenous and caulicolous from a diffused mycelium or from scattered infections, numerous, subcircinately crowded on brownish, orbicular spots, or evenly distributed over large areas, roundish, 0.2–0.6 mm. across, tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores obovoid or pyriform, 21–29 by 32–42 μ; wall cinnamon-brown, sometimes lighter-colored at apex and base, variable in thickness, 1.5–3 μ, thickened at apex, 3–7 μ, sparsely and conspicuously echinulate, the pores 2–4, usually 3, approximately equatorial or scattered.

III. Telia amphigenous, scattered or irregularly to circinately crowded, round, 0.2–0.7 mm. across, early naked, pulvinate, orange-yellow or cinereous by germination, ruptured epidermis inconspicuous; teliospores fusiform or cylindric, 13–23 by 39–58 μ, frequently narrowed above and below; wall colorless, very thin, 1 μ or less, not thickened at apex, smooth; pedicel colorless, once to twice length of spore, persistent.

ON HELIOTROPIACEAE:
Tournefortia microphylla Bertero, Porto Rico.
Tournefortia velutina H.B.K., Oaxaca.
Tournefortia volubilis L., Cuba.
TYPE LOCALITY: Oaxaca, Mexico, on *Tournefortia velutina*.
DISTRIBUTION: Southern Mexico and the West Indies; also in South America.
EXSICCATI: Barth. N. Am. Ured. *1286*.

6. **Klebahnia pressa** (Arth. & Holway) Arthur.

Uromyces pressus Arth. & Holway; Arth. Mycologia **10**: 125. 1918.

O. Pycnia epiphyllous, few, inconspicuous, yellowish-brown, globoid, 112 μ in diameter by 110 μ high; ostiolar filaments extending but slightly above the ostiole.

II. Uredinia amphigenous, gregarious on discolored spots 1–3 mm. in diameter, oval or oblong, 0.2–0.4 mm. long, early naked, pulverulent, yellowish-brown, ruptured epidermis conspicuous; urediniospores obovoid or globoid, 23–26 by 27–32 μ; wall yellowish or pale cinnamon-brown, thick, 2–3.5 μ, moderately and rather coarsely echinulate, the pores 3, approximately equatorial.

III. Telia amphigenous, scattered, oval or oblong, 0.2–0.3 mm. long, early naked, pulvinate, white, ruptured epidermis rather inconspicuous; teliospores oblong-ellipsoid or fusiform-ellipsoid, 16–18 by 29–35 μ, rounded or somewhat narrowed above, narrowed below; wall colorless, very thin, 0.5 μ, not thickened at apex, smooth; pedicel colorless, about one-half length of spore.

ON CARDUACEAE:
Vernonia Deppeana Less., Costa Rica; Guatemala.
TYPE LOCALITY: San José, Costa Rica, on *Vernonia Deppeana*.
DISTRIBUTION: Central America; also in South America.

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